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DESCRIPTIVE CATALOGUE

OF THE

SPECIMENS ILLUSTRATING

MEDICAL PATHOLOGY

IN THE

MUSEUM OF UNIVERSITY COLLEGE, LONDON.

BY

CHARLES STONHAM, F.R.C.S.,
CURATOR OF THE MUSEUM.

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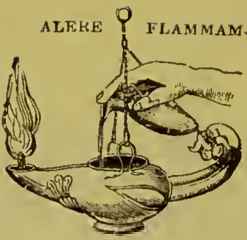

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PREFACE.

SOME years ago Drs. Barlow and Harrington Sainsbury began this descriptive Catalogue of the specimens illustrating Medical Pathology in the Museum of University College, London.

Three years ago Dr. Sainsbury found it necessary to retire from the work, and his place was taken by Dr. Angel Money. The Catalogue made but little progress, and the help of Mr. Charles Stonham was fortunately secured. To him the preparation of this work is almost entirely due.

T. BARLOW.
A. MONEY.

TABLE OF CONTENTS.

Series.	Specimens illustrating	Numbers.	Page
XXXVIII.	Diseases of the Peritoneum	3000 to 3030	1
	Acute Peritonitis	3000 to 3003	1
	Tubercular Peritonitis		2
	Morbid Growths	3010 to 3024	3
	Loose bodies in the Peritoneal Cavity	3025 and 3026	6
	Diseases of the Mesenteric Glands	3030	7
XXXIX.	Diseases of the Stomach	3035 to 3062	7
	Gastric Softening	3035 and 3036	7
	Hypertrophy and Dilatation	3038 and 3039	8
	The effects of Poisons	3040 to 3042	9
	Gastritis	3043 and 3044	10
	Gastric Ulcer	3045 to 3055	11
	Cancer	3056 to 3062	14
XL.	Diseases of the Intestines	3065 to 3120	16
	Diverticula	3065	16
	Enlargement of Adenoid Structures	3068 to 3071A	17
	Dysentery	3072 to 3087	18
	Typhoid	3088 to 3099	22
	Tubercle	3100 to 3107	27
	Cholera	3108 to 3111	30
	Cancer	3112 to 3116	31
	Hæmorrhage	3120	33
XLI.	Diseases of the Liver	3125 to 3168	34
	Fatty Degeneration	3125	34
	Albuminoid Degeneration	3126	34
	Mechanical Congestion	3127 and 3128	35
	Cirrhosis	3129 to 3131	36
	Suppurative Hepatitis	3132 and 3133	37
	Syphilitic Hepatitis	3134 and 3135	39
	Tubercular Hepatitis	3136	40
	Morbid Growths	3137 to 3155	40
	Hydatids	3157 to 3168	43
XLII.	Diseases of the Gall-bladder	3170 to 3193	46
	Calculi	3170 to 3189	46
	Effects of Calculi	3190 to 3192	48
	Cancer	3193	49
XLIII.	Diseases of the Pancreas	3195 to 3200	50
	Inflammation		50
	Atrophy and Fatty Degeneration	3195	50
	Obstructed Duct	3196 and 3197	50
	Morbid Growths	3198 to 3200	51

Series.	Specimens illustrating	Numbers.	Page
XLIV.	DISEASES OF THE SPLEEN	3201 to 3217	51
	Atrophy and Softening	3201	51
	Enlargement. Leukæmia		52
	Waxy Degeneration	3202 and 3203	53
	Inflammation		53
	Capsulitis	3204 to 3207	53
	Tubercle	3208 to 3212	54
	Morbid Growths	3213 to 3215	55
	Infarcts	3216 and 3217	55
XLV.	DISEASES OF THE PERICARDIUM	3220 to 3239	56
	"Milk spots"	3220	56
	Pericarditis	3221 to 3237	56
	Cancer	3238 and 3239	59
XLVI.	MALFORMATIONS OF THE HEART	3240 to 3252	60
XLVII.	DISEASES OF THE MUSCULAR SUBSTANCE OF THE HEART	3253 to 3292	65
	Hypertrophy; Dilatation	3253 to 3257	65
	Atrophy	3258	68
	Fatty Degeneration	3259	69
	Myocarditis	3265 to 3267	70
	Aneurysm of the Heart	3270 to 3274	71
	Rupture	3275 to 3280	73
	Coagula in the Heart	3281 to 3283	74
	Morbid Growths	3285 to 3292	75
XLVIII.	ENDOCARDITIS. VALVULAR DISEASE	3295 to 3336	77
	Disease of the Mitral Valve	3295 to 3310	78
	Disease of the Aortic Valve	3311 to 3332	81
	Disease of the Tricuspid and Pulmonary Valves	3333 to 3336	85
XLIX.	DISEASES OF THE LUNGS AND PLEURÆ	3340 to 3405	86
	Pleuritis. Empyema	3340 to 3350	86
	Pulmonary Collapse		89
	Emphysema	3355 to 3358	89
	Plastic Bronchitis	3359 to 3361	90
	Pneumonia. Abscess and Gangrene	3362 to 3364	91
	Phthisis	3370 to 3388	92
	Pulmonary Apoplexy—Embolism	3389 and 3390	96
	Morbid Growths	3391 to 3405	97
L.	DISEASES OF THE SUPRA-RENAL CAPSULES	3410 to 3415	101
	Addison's Disease	3410 to 3415	101
LI.	DISEASES OF THE KIDNEYS	3416 to 3451	103
	Atrophy and Degeneration	3416 to 3419	103
	Cystic Disease	3420 to 3427	104
	Congenital Cystic Disease	3428	106
	Bright's Disease	3429 and 3430	107
	Abscess	3435 to 3438	108
	Tubercle	3440 to 3448	109
	Morbid Growths	3449 to 3451	110
LII.	DISEASES OF THE BRAIN AND ITS MEMBRANES	3460 to 3537	111
	Meningitis	3460	111
	Hydrocephalus	3465	111
	Apoplexy	3466 to 3474	112
	Aneurysm of the Basal Arteries and Varix	3475	115
	Thrombosis and Embolism	3480 to 3483	115
	Cerebral Abscess	3484 to 3487	117
	Tubercle—Tubercular Meningitis	3488 to 3498	118
	Morbid Growths	3500 to 3519	121
	Cysts	3520	126
	Blood-cysts	3521 to 3523	127
	Parasites	3524 to 3526	127
	Concretions	3527 to 3532	128
	Miscellaneous Specimens	3533 to 3537	129

[illegible] ICAL SOCIETY

Series.	Specimens illustrating	Numbers.	Page
LIII.	DISEASES OF THE SPINAL CORD	3538 to 3544	131
	Degenerations	3538 to 3541	131
	Crossed Paralysis	3539	131
	Locomotor Ataxy	3540	132
	Transverse Myelitis	3541	133
	Tumours	3542 to 3544	133
LIV.	PARASITES	3550 to 3569	134
	Trematoda	3550	134
	Cestoda	3551 to 3563	135
	Nematoda	3564 to 3569A	138
	WAX MODELS	3570 to 3655	141
	DISEASES OF THE PERITONEUM.		
	Peritonitis	3570	141
	DISEASES OF THE STOMACH AND INTESTINES.		
	Effects of Poisons on the Stomach	3571 to 3577	141
	Gastric Ulcer	3578 and 3579	142
	Gastric Cancer	3580 to 3583	142
	Tubercle of the Intestines	3584 to 3588	142
	DISEASES OF THE LIVER.		
	Cirrhosis	3589 and 3590	143
	Abscess	3591 to 3593	143
	Syphilis	3594	144
	Cancer	3595 to 3601	144
	Hydatids	3602 and 3603	145
	DISEASES OF THE SPLEEN.		
	Colloid Cancer	3604	145
	DISEASES OF THE HEART.		
	Fatty Heart	3605	145
	Sarcoma of the Heart	3606	145
	DISEASES OF THE LUNGS AND PLEURÆ.		
	Pleurisy and Empyema	3607 to 3610	146
	Pulmonary Collapse and Emphysema	3611	146
	Pneumonia, Abscess, and Gangrene	3612 to 3620	146
	Phthisis	3621 to 3625	147
	Gumma of the Lung	3626	147
	Morbid Growths of the Lung	3627	148
	DISEASES OF THE KIDNEY.		
	Atrophy	3628 and 3629	148
	Cystic Disease	3630	148
	Bright's Disease	3631 to 3634	148
	Renal Abscess	3635 to 3637	149
	Tubercular Kidney	3638	149
	Tumours of the Kidney	3639 and 3640	149
	Gravel in the Kidney	3641	150
	Emboli in the Kidney	3642	150
	Vesicles in the Ureter	3643	150
	DISEASES OF THE BRAIN AND ITS MEMBRANES.		
	Meningitis	3644	150
	Apoplexy	3645 to 3647	150
	Aneurysm	3648	151
	Thrombosis and Embolism	3649 to 3653	151
	Tumours	3654 and 3655	153

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DISEASES

OF THE

ALIMENTARY TRACT.

SERIES XXXVIII.—DISEASES OF THE PERITONEUM.

ACUTE PERITONITIS.

The peritoneum usually follows the pathological destiny of the viscera it invests. Acute inflammation of the peritoneum may be, though rarely is, a primary affection. It is usually secondary to some disease or injury of the Intestines (No. 3000) or abdominal viscera, or it may complicate some general condition, *e. g.* Pyæmia, Chronic Nephritis.

The amount and nature of the effusion varies, being chiefly dependent upon the cause. Thus there may be very little effusion, forming a thin pellicle of lymph matting the coils of gut to one another (No. 3000) and ultimately becoming organized and forming adhesions (Nos. 3001, 3002). The lymph thrown out is pale yellowish or straw-coloured, and is most abundant where the coils of gut come in contact. At first it can be easily peeled off, and the surface underneath is found to be smooth, shiny, and apparently unaltered. At some subsequent period the adhesions thus formed may produce internal strangulation of the gut (*vide* 'Surgical Catalogue,' Part I. p. 235), or, if very extensive, may materially hamper the peristaltic movements of the intestines (No. 3001). This variety is known as Dry or Adhesive Peritonitis.

In other cases the main feature in the process is a large effusion of serous or sero-fibrinous fluid. This may be in such quantities as to seriously hamper the movements of the diaphragm. The fluid is frequently turbid and contains flakes of lymph floating in it. In some cases it very closely resembles the fluid met with in simple ascites, but differs from it in containing (in common with all inflammatory effusions) a very large quantity of albumen.

Again, the fluid may present any variety of appearance from that now described to pure pus. Purulent peritonitis is most usually localized and is due, in many cases, to perforation of the gut. The abscess thus formed may burst into the general cavity of the peritoneum or into the gut. In some cases blood is mixed with the effusion, especially in those patients who are the subjects of Hæmophilia, Scurvy, or Purpura. In rare cases the fluid possesses a colloid consistence.

In the early stages of Acute Peritonitis the surface of the membrane is injected, often in an irregular and patchy manner, and sometimes petechial hæmorrhages are present.

Acute Peritonitis may be local or general; in the latter case it is usually more intense at its place of origin. Acute Peritonitis may occur in intra-uterine life or in newly-born children, when it is generally of an infective nature and set up by extension from the umbilicus. In Chronic Peritonitis the membrane becomes thickened and very dense in consequence of fibroid overgrowth (No. 3003).

3000. A loop of small intestine showing recent peritonitis. The surface of the peritoneum is covered with a layer of lymph. This readily peels off in thin flakes from some parts of the surface, but at others adheres more firmly. Along the line of contact of the coils the coating of lymph ceases abruptly, the adjacent surfaces of the loop of intestine being quite free from it. The friability of the exudation and its slight adhesion to the surface indicate the recent nature of the inflammation. 691

History.—The specimen is from a case of acute peritonitis, following a rupture of the duodenum caused by a carriage-wheel passing over the abdomen. The patient died 17 hours after the accident.

3001. A portion of the anterior wall of the abdomen with a loop of small intestine adherent to it. The adhesions are quite recent and can be readily broken down. At the bend of the loop the lymph is very abundant and is firmer than elsewhere. Delicate adhesions unite the contiguous surfaces of the gut to one another. The parietal and visceral layers of the peritoneum are covered with a continuous layer of lymph. The impediment to free peristalsis, which such adhesions must cause, is obvious; also the danger of intestinal obstruction from the organization of this lymph forming cicatricial bands, especially at the bend of the loop where the lymph is most abundant. 3776

3002. A uterus, piece of small intestine, and vermiform appendix. A slender cord-like adhesion is attached to the posterior surface of the uterus and by the other end to the mesentery of the small intestine. A second shorter and more slender band stretches from about the middle of the first to the vermiform appendix near its tip. The right Fallopian tube is bent backwards on itself and its end is united to the side of the body of the uterus by a broad band of adhesion. The left one is bent backwards and downwards and is united to the uterus in its whole extent by adhesions. The fimbriæ of the tubes have disappeared. There were no other signs of old peritonitis. 6516

3003. A piece of the parietal peritoneum which is very much thickened and indurated. The inner surface is quite smooth, but to the outer is attached muscular and loose connective tissue. The density of the membrane is great, it being almost of the consistence of cartilage. 3794

For wax model of Acute Peritonitis see page 141, *No.* 3570.

TUBERCULAR PERITONITIS.

Tubercular affections of the abdominal viscera are not usually associated with tubercular peritonitis, although in these cases small discrete tubercles are often seen in the subperitoneal tissue (Nos. 3100, 3101). At the same time tubercular peritonitis is usually associated, though not always, with tubercle in other parts of the body. The tubercular nodule found affecting serous membranes is essentially the same as that occurring elsewhere. The distribution of the nodules varies in different cases; in many the peritoneal surface of the diaphragm and that covering the flanks is more affected than any other part. In almost all cases there is a large effusion of lymph matting the coils of gut intimately together, and the intestines to the viscera, so that they may be torn in removal from the body. There may also be a large serous effusion causing ascites; this may be blood-stained. Tuberculous nodules may be found scattered through the masses of lymph. They may form large caseous masses by confluence of neighbouring foci of disease and by the involvment of the mesenteric glands (No. 3105). The peritoneum and subperitoneal tissue are much thickened by exudation. The masses of tubercle usually soften and form caseous areas, setting up suppuration in the neighbourhood: by this means the intestine may be perforated from without and the abscess become filled with gas and fæcal matter. In rarer cases the abscess tends to burst externally at the umbilicus, or the pus may find its way between the layers of the abdominal wall. In rare cases the tuberculous masses become calcified and dry up.

For specimens of Tubercular Disease of the Peritoneum see page 27, Tubercular Disease of the Intestines.

Morbid Growths of the Peritoneum and Subperitoneal Tissue.

Cancer affecting any of the abdominal viscera will, in most cases, sooner or later spread to the peritoneum investing them. Any form of cancer may be met with, colloid being more commonly seen in connection with the peritoneum and omentum than in any other part of the body (Nos. 3010, 3011). In some cases the peritoneum may be seen studded with patches of cancer (Nos. 3012, 3013), and it is probable that in such the cells have been scattered broadcast through the abdominal cavity in consequence of softening of a patch of cancer in one of the viscera. Cancer of the peritoneum sometimes proves fatal by hæmorrhage or acute peritonitis.

Sarcoma may spread from some neighbouring organ or may originate in the connective tissue. Large retro-peritoneal sarcomata are not uncommon (No. 3016). In the proliferous cysts of the ovary the intracystic growths, should the cyst rupture will often grow over the whole of the peritoneal surface.

Sarcomata, like Cancer, may set up peritonitis. They are very vascular and degenerate like similar tumours elsewhere.

Fibrous and Fatty Tumours may be met with in the omentum or subperitoneal tissue (Nos. 3017, 3019).

Cysts. Simple cysts of the peritoneum are sometimes seen (Nos. 3020 and 3065). See 'Surgical Catalogue,' No. 2225 A.

Hydatid cysts, chiefly in the subperitoneal tissue, not infrequently occur in association with similar disease in the Liver and sometimes alone.

Vide *Hydatids of the Liver*, p. 43.

3010. A portion of the great omentum affected by Colloid Cancer. The growth has a spongy appearance, the meshes of the sponge-work being more or less completely filled with a translucent jelly-like material. 2277

3011. A portion of the colon with the great omentum, affected by Colloid Cancer. The omentum is considerably thickened and transformed into a semi-translucent gelatinous mass of very irregular surface. The thickening is most marked along the free border. The transverse meso-colon on one aspect close to the gut and the appendices epiploicæ show similar changes. The piece of gut has been laid open; the mucous membrane is apparently normal, but at one end the walls are distinctly thickened; the thickening appears to affect all the coats of the gut, but especially the muscular, which is at one end double the thickness it attains at the other. 2243

3012. A portion of the parietal peritoneum and abdominal wall, from a case of cancer. The surface is studded with small nodules of new growth. Some of these nodules are extremely small and all of them closely resemble miliary tubercles. They are smooth on the surface, being covered by the endothelium. 5460

History.—Benjamin T., æt. 65, was admitted under Dr. Ringer, Sept. 27th, 1879, and died on Oct. 11th. At the post-mortem examination cancer of the pylorus was found with secondary deposits affecting the whole of the peritoneum and abdominal lymphatic glands, which formed large masses of new growth in the gastro-hepatic omentum. The abdomen was full of clear ascitic fluid and the omentum was adherent to the abdominal wall. The thoracic and abdominal viscera were otherwise healthy.

3013. Two pieces of small intestine from a patient who died of malignant disease of the ovaries. The peritoneal surface is covered with small brownish specks, as if it had been dusted over with sand. Near one end, and close to the mesenteric border, is a small raised patch with a finely villous surface; two other similar patches are seen on the other piece of gut. The smaller specks are readily scraped off, but some are more firmly adherent. They are probably small particles of fibrine separated out from the ascitic fluid and holding blood-cells entangled in their meshes. The villous patches are secondary growths. 5558

History.—Esther Bowles, æt. 37, was admitted under Dr. Hewitt, Sept. 13th, 1880, and died Jan. 11th, 1881. There had been loss of flesh for the past 12 months with swelling of the abdomen and looseness of the bowels for 3 months. On admission there was much fluid in the abdomen. The uterus was moveable but low down, and a tumour could be felt behind it and to the left. The abdomen was repeatedly tapped and a sanguineous fluid drawn off. Œdema of the lower extremities necessitated puncture, but gangrene supervened just before death.

Post-mortem Examination.—There was cancerous infiltration of both ovaries, of the omentum and peritoneum. The intestines were extensively bound down and their surface covered over with the minute specks illustrated by the specimen. Recent lymph in both pleuræ; diaphragm and liver cancerous.—*Vide* Dr. Hewitt's *Case-book*, 1881, p. 70.

3014. A piece of the lower end of the ileum showing two small rounded nodules of new growth projecting underneath the peritoneal coat. There is no indication of the growths on the mucous surface. 5044

History.—Jane R., æt. 56, admitted April 27th, 1864, under Sir Wm. Jenner. The present illness dated from Christmas, 1863. The chief symptoms were abdominal pain and distension with chronic constipation, and general loss of health and strength. On admission the abdomen was greatly distended, and there was colicy pain much increased by pressure. There was ascitic fluid in the flanks. Examination of the rectum and vagina showed a tumour compressing the former. On May 6th lumbar colotomy was performed, but no relief followed, and death occurred the next day.

Post-mortem Examination.—The uterus was found to be extensively infiltrated with cancer, which had invaded the surrounding parts, causing compression of the rectum and sigmoid flexure. One coil of the small intestine, dipping into the pelvis, was found to be quite occluded by implication in the tumour and other coils were adherent to the fundus uteri.—*Vide* Sir Wm. Jenner's *Case-book*, 1864, p. 349.

3015. A piece of the great omentum, growing in which is a rounded mass of Columnar Epithelioma secondary to disease in the rectum. The omentum is otherwise healthy. 6196

History.—A. W., æt. 32, admitted into University College Hospital under Mr. Hill, on Jan. 5th, 1885, on account of malignant disease of the rectum. On Jan. 29th colotomy was performed, and the patient left the Hospital on March 9th. He was readmitted on Feb. 6th, 1886, complaining of pain along the ascending colon. A solid mass was felt in this situation. On

Feb. 16th, he had a severe rigor, lasting 20 minutes, followed by inability to pass his urine, which was very offensive and loaded with pus. No urine was secreted on the 19th and 25th. The patient died in the afternoon.

At the *post-mortem examination* the right kidney was found to be acutely inflamed, with scattered points of suppuration. There were secondary growths in the omentum and abdominal wall.

3016. A portion of small intestine with its mesentery. Growing between the layers of the mesentery is a large small-round-celled sarcoma measuring 3¼ by 2½ inches. It is quite smooth on the surface, being invested by the layers of the mesentery. The cut surface bulges slightly, and shows one or two small areas of degeneration. The mesenteric glands are slightly enlarged, and the peritoneal coat of the intestine is covered with small polypoid masses of new growth. 6403

History.—S. R., æt. 41, was admitted under Mr. Heath on Sept. 24th, 1888. He complained of pain on the left side of his abdomen since Dec. 1887; the tumour was first noticed in July, 1888. There was constipation and wasting, but no signs referable to any of the abdominal viscera. On admission a large solid tumour was found on the left side of the abdomen. On Oct. 3rd laparotomy was performed, the incision being made in the left linea semilunaris. The operation was abandoned as the growth could not be removed. The patient died on the second day. There were two very small nodules in the liver.

3017. A portion of a large tumour growing in connection with the mesentery. Its outer surface is covered by thickened peritoneum. The section shows the tumour to consist mainly of fat, traversed by bundles of connective tissue. At the margins the fatty nature is less evident, the tumour here being white and opaque. Two rounded spongy masses are seen about the centre of the cut surface. 4905

3018. A piece of the ileum laid open along its free border. The mesenteric border shows an enormous accumulation of fat between the layers of the peritoneum; such is the extent of this that in places the gut is nearly encircled. The walls of the gut are greatly thickened, in some places measuring more than ¼ inch; the thickening implicates all three coats. The fat in places forms pendulous masses like appendices epiploicæ. 1624

3019. A piece of omentum with an ossified tumour growing in it. The growth is spherical and about the size of a large marble; the outer surface is slightly uneven; the cut surface is dense but distinctly fibrous-looking, presenting a wavy appearance. The tumour is hard, but yields slightly on firm pressure. It is probably a fibro-sarcoma which has undergone partial ossification. 4182

History.—I. V., æt. 55, was knocked down by a sheep and sustained a fracture of the thigh; this did well, the patient walking again in two months, although there was a good deal of swelling which was thought to be callus. This increased rapidly, fungated, and the patient died eleven months after the injury.

At the *post-mortem examination* the mass round the femur was found to be dense and ivory-like in parts, in others less hard and containing cheesy masses. The lungs were found to be covered with flattened plates of fibro-cartilaginous density; and calcareous nodules were found in the lung-substance. Besides the specimen preserved, a similar growth was found in the substance of the diaphragm.

On microscopic examination the growths were found to consist of interlacing wavy fibres arranged concentrically. The soft tissue was in parts infiltrated with cells. The hard material had the structure of normal bone in a modified form.

For a full account of the case and drawings of the specimens, *vide* Pathological Trans. vol. vi. p. 317. For the lung, *Vide* No. 3403; also consult Surgical Catalogue, Part I. No. 671.

3020. A piece of the diaphragm attached to the abdominal surface of which are pendulous processes of the peritoneum. The longest measures over three inches, the smallest not more than ¼ inch in length. These processes contain a little fluid, and resemble somewhat large appendices epiploicæ. Similar but fewer cysts are often seen at post-mortem examinations. 5512

3021. A piece of the great omentum, between the layers of which is a rounded hydatid cyst which has been bisected. The cyst measures 2½ inches in diameter; its walls are extensively calcified so that they cannot be indented by the finger. The wall varies in thickness up to ¼ inch. The parasitic cyst-wall has in parts fallen away from the adventitious and has lost its normal appearance. The contents are translucent, slightly opaque and jelly-like, consisting of the broken-down daughter cysts, some of which can be separated. 1299

3022. A large fibrous cyst from the omentum of a middle-aged woman. It is oval in shape and measures eight inches in its longest diameter. The wall is very dense, varying in thickness up to ¼ inch, and composed of layers of fibrous tissue arranged concentrically; some of the inner ones have been separated from one another. Internally it is quite smooth; externally some omentum is still adherent; in other parts it is smooth, and in others again pitted and worm-eaten in appearance. There is no calcification. The specimen is the adventitious cyst-wall of a hydatid; in the bottom of the bottle are some of the daughter cysts which were contained in it. 2287

3023. The cæcum, ileo-cæcal valve, and lower part of the ileum laid open. The vermiform appendix cannot be distinguished. Under the peritoneal coat of the cæcum is a loculated hydatid cyst; two of the cavities have been laid open. They do not communicate. Each of them contained small daughter cysts. The parasitic cyst-wall is present but shrunken from immersion in spirit, the adventitious wall is thickened and dense. 6493

3024. The bladder and rectum laid open. Two hydatid cysts lie between them; they communicate with one another and contain daughter cysts. The peritoneum forming the recto-vesical pouch is much thickened and closely resembles skin in appearance. Between the upper part of the rectum and the higher of the two cysts, the peritoneum forms a long finger-like pouch which passes for about three inches downwards and to the right. 5866

Vide Dr. Ringer's *Case-book*, 1883.

Loose Bodies in the Peritoneal Cavity.

Fibroid tumours of the uterus and ovarian cysts may sometimes become detached by twisting of their pedicle of attachment (No. 3025).

Occasionally such tumours continue to grow, since they have, before being detached from their original seat, contracted adhesions to some part of the peritoneum, and through these are in receipt of blood.

Small flattened oval bodies, resembling the melon-seed bodies found in bursæ and joints, are sometimes met with lying loose in the peritoneal cavity. They are detached appendices epiploicæ.

In cases of ascites, lumps of gelatinous jelly-fish-like material are often seen; they are simply coagulation products.

3025. Two small cysts which were found lying loose in the peritoneal cavity. They are both covered by peritoneum. The larger cyst is solid and consists of a firm fibrous-looking tissue, situate in the middle of which is an extremely dense bony mass, containing in its interior some soft organic matter. This is a malformed tooth; on close examination in the neighbourhood of this tooth, a few minute very fine hairs could be removed by the forceps. The tumour is therefore a dermoid. The smaller cyst contained caseous matter, and lying in it is a dense piece of calcareous material. The wall can be readily separated into two layers. The cysts probably originated in the ovary and became detached. 2226

3026. A slender antler-shaped piece of bony substance removed from the omentum of a sheep. 3825

Diseases of the Mesenteric Glands.

The mesenteric lymphatic glands are liable to the same pathological changes met with in lymphatic glands elsewhere.

For an account of these consult the Surgical Catalogue, Pt. II. p. 541.

Should the glands break down, whether as the result of some inflammatory affection or some new growth, the process may lead to perforation of the hollow viscera, and to inflammation of the peritoneum.

(*Vide* Nos. 3094 and 3105.)

3030. A portion of the small intestine and its mesentery, from a case of Addison's Disease. The mesenteric glands are enormously enlarged, but are clearly outlined from one another. They are not broken down in any part, but are uniformly hard and dense. They are lymphadenomatous. 5867

Series XXXIX.—DISEASES OF THE STOMACH.

Gastric Softening.

Softening of the coats of the stomach, independently of any inflammatory mischief, is occasionally met with. The condition is probably due to fermentation changes occurring post-mortem, and liberating acids, which, in the absence of the alkaline blood, lead to self-digestion.

Some authorities have regarded it as being the result of definite morbid conditions of the walls associated with special symptoms; others, again, have attributed it to trophic changes dependent on interference with the nerves supplying the organ, the condition thus closely resembling the inflammatory affections of the bladder consequent on spinal injury, or sloughing of the cornea from injury of the fifth nerve. Softening is specially likely to occur in those killed suddenly, more particularly if digestion is going on at the time of death.

The whole stomach may be affected, but more usually the process is limited to the fundus and posterior wall (No. 3035). The affected area may be sharply defined (No. 3036), or may gradually pass into the healthy mucous membrane. The depth to which the softening occurs also varies, in some cases it leads to perforation. A similar condition may be occasionally met with in the œsophagus and small gut and other viscera if perforation of the stomach has occurred.

The walls of the organ become thinned in marked contrast to the thickening seen in inflammatory affections; the affected area is transparent and gelatinous in appearance, and has lost all normal characters, whereas in inflammation the mucous membrane is rendered more opaque than natural.

In the early stages of the process the mucous membrane may separate in fine gelatinous flakes.

If perforation should occur the margins of the opening are eroded and ragged, and present appearances very like those of half-digested meat.

The vessels containing black blood will be seen ramifying over the surface; in some cases they become eroded by the process and give rise to small hæmorrhages.

It is important to distinguish this form of softening from that produced by inflammatory changes and by irritant poisons.

3035. A portion of the posterior wall and cardiac end of a stomach, showing post-mortem destruction of the mucous membrane. The affected area is defined, but at the margins the destruction of the mucous membrane is less extensive than in the centre, where it has entirely disappeared, the muscular coat being exposed. With the exception of the softened area, the stomach is quite normal in appearance. The condition is sometimes described as post-mortem gastromalacia.
1806

3036. A stomach which has been everted. The mucous membrane at the cardiac end and over almost the whole of the posterior surface has entirely disappeared: the destruction is sharply demarcated, and has rendered the walls much thinner than natural; this is especially noticeable about the middle of the posterior wall. The undestroyed mucous membrane is smoother than natural, and presents numerous small, round, quite smooth pits, similar to those seen in Gruyère cheese. It will be seen that these small pits are more numerous on the summits of the rugæ than in the neighbouring sulci. 4185

The condition is due to post-mortem digestion.

Hypertrophy and Dilatation of the Stomach.

Chronic obstruction at the pyloric orifice of the stomach leads to compensatory hypertrophy of its muscular coat. When the amount of hypertrophy is insufficient to overcome the obstruction, dilatation ensues.

Dilatation may also exist independently of any obstruction, or of hypertrophy; in such cases it is brought about by weakness of the coats of the stomach, as in cases of atrophy or more or less complete paralysis of the muscle-tissue. Chronic over-distension may also produce it. In simple dilatation the walls will be found to be considerably thinned, and the rugæ obliterated; the size of the organ may be enormously increased.

In rare cases thickening of the stomach-walls is met with without obstruction, and independently of chronic gastritis, which induces great thickening and induration of the mucous membrane.

The thickening affects all the coats, but especially the muscular and submucous, and may be partial, local, or general; if local the pyloric end is usually the part implicated (No. 3038).

In some cases it is probable that the thickening is due to inflammation, leading to an overgrowth of fibrous tissue, which may, by pressure, lead to atrophy of the muscular coat. The walls of the stomach may attain a thickness of 1½ inches, and its cavity be much diminished. The rugæ are usually more marked than natural (No. 3038).

Owing to the increased thickness of the walls the stomach is very rigid and unable to collapse (Nos. 3038, 3039).

3038. The anterior half of a stomach. The walls, especially the muscular coat, are much thickened and hypertrophied as the result of Chronic Gastritis. The muscular is well marked off from the thickened submucous and mucous coats. The thickening does not affect the cardiac end, ending almost abruptly; if the specimen be held up to the light the difference in the appearance of the thickened and normal parts is very striking. To the feel the organ is hard, dense, and rigid. The rugæ are pronounced and permanent, they cannot be obliterated by stretching the organ. The peritoneal coat is smooth and thickened. 6

3039. The posterior half of a stomach, the capacity of which is much diminished by hypertrophy of the muscular and inflammatory thickening of the submucous coats. The thickening of the walls is such that the organ shows no tendency to collapse, but by their rigidity they maintain a permanent patentcy for the viscus. The hypertrophy of the muscular coat becomes much more marked at the pyloric end, and of the submucous at the cardiac. The mucous membrane is thickened and convoluted with deep intervening sulci; this convolution is less marked at the cardiac end than in the middle, and is abundant at the pylorus. The bend of the organ at the small curvature is increased so that the pylorus and cardiac end tend to approximate. The organ resembles, in general appearance, a leather bottle.

THE EFFECTS OF CAUSTIC FLUIDS AND POISONS ON THE STOMACH.

For descriptive heading see Surgical Catalogue, Part I. p. 203.
For other specimens see Wax Models, page 141, *Nos.* 3571 *to* 3577.

3040. A portion of the stomach, showing ulceration from the effects of hydrochloric acid poisoning. At about 1¼ inches from the pylorus, and in the greater curvature, is an oval ulcer measuring 1¼ inches by ¾ inch. The outline is slightly irregular, the edges sharp at one spot, shelving at another. The ulcer is shallow, and its floor is rough, being apparently formed of submucous tissue and muscular fibres. The mucous membrane elsewhere is healthy in appearance. The peritoneum over the ulcer is roughened. 5315

History.—W. Webb, aged 13, admitted under Dr. Wilson Fox, May 1st, 1868. On April 30th he had swallowed about an ounce of hydrochloric acid rather diluted. Since then there had been repeated sickness and constant pain in the stomach. The vomit was mixed with blood. The vomiting and pain had ceased by May 3rd, and the patient complained of feeling hungry. Death occurred suddenly on May 14th from hæmatemesis.

Post-mortem Examination.—The stomach was adherent to the abdominal wall by well organized lymph. The mucous membrane of the tonsils, pharynx, and œsophagus was opaque and soft. There were no other pathological changes in the body.

3041. A portion of the anterior wall of the stomach, from a woman who died from the effects of a large dose of colchicum.

The mucous membrane at the cardiac end has been extensively destroyed by ulceration, the submucous coat being exposed and of a dead-white colour; the mucous membrane which remains is shreddy, and has a worm-eaten reticulate appearance. The line of demarcation between the ulcerated and healthy mucous membrane is very abrupt.

There are no signs of inflammation of the peritoneal coat. 2432

3042. The œsophagus, stomach, and duodenum of a patient who was poisoned by hydrochloric acid. The mucous membrane is black in colour, more especially in the stomach. It is swollen and very soft. In the œsophagus the mucous membrane is longitudinally ridged, and not so deeply stained. The coats of the stomach are much thickened by inflammatory swelling. The colouring of the peritoneal coat is partly due to the fact that the specimen had discoloured the fluid in which it was preserved. There is no evidence of peritonitis.

GASTRITIS.

Gastritis may be acute or chronic.

Acute gastritis can only be very imperfectly shown in Museum specimens, as many of the appearances disappear shortly after death, and the parts become decolourized by immersion in spirit.

It should also be borne in mind that certain post-mortem changes not unfrequently occur in the stomach, especially in cases of sudden accidental death, which somewhat resemble acute inflammation. (*Vide* p. 7.)

In acute gastritis there is much injection of the mucous membrane, the surface of which is covered with a layer of tenacious mucus, and may present capillary hæmorrhages (No. 3043). Similar appearances are often seen in death from heart disease or cirrhosis of the liver. The surface is dry owing to the diminished secretion of gastric juice.

A rare form of acute inflammation has been met with, affecting chiefly the submucous coat and passing on to suppuration. This is known as phlegmonous or interstitial purulent gastritis.

It may occur either as a circumscribed abscess or, much more rarely, as diffuse suppuration. The coats of the stomach become much swollen and infiltrated, and may, in some cases, be quite indistinguishable from one another. In the case of abscess recovery may occur. These abscesses may occur as primary affections or may be secondary to some general infective process.

Chronic gastritis produces very considerable thickening of the coats of the stomach, due to an increase in the interstitial connective tissue (Nos. 3038, 3039). The mucous membrane may be injected or pale, or present the peculiar pigmented condition commonly seen in the neighbourhood of chronic inflammations, *e. g.* chronic ulcer of the leg. A tough layer of mucus may be adherent.

The surface of the mucous membrane has a shaggy appearance, owing to the projection of tags of mucous membrane between the gastric glands, the projection being caused by an increase in the connective tissue. In some cases the epithelium lining the glands proliferates; in others, the glands become pressed upon by the connective tissue round them, and dilate into small cysts, in the same way that cysts are formed in chronic inflammation of the breast.

The submucous and muscular coats also become much thickened by an increase in the connective tissue. In some cases the peritoneum may share in the process.

3043. A dried preparation showing petechial extravasations in the mucous membrane of the stomach. The vessels are engorged. 2168

3044. A portion of the stomach near the pyloric end, from a case of chronic gastritis. The mucous membrane is much hypertrophied, two strongly marked longitudinal ridges of it are seen running close up to the pyloric valve, secondary smaller ridges are also seen. The follicles of the stomach are enlarged. 2289

Also see Nos. 3038, 3039, *showing the results of Chronic Gastritis.*

CONTRACTION AND STRICTURE OF THE STOMACH.

The stomach may become much smaller on account of fibroid thickening of the walls consequent on chronic gastritis (Nos. 3038, 3039).

It may become contracted at one part by the healing of a gastric ulcer; and this may lead to hour-glass contraction (No. 3055). (*Vide* Gastric Ulcer, *infra.*)

The pyloric orifice may be narrowed by cicatrization following ulceration, or by the growth of a cancer (Nos. 3056, 3059). (*Vide* Cancer of the Stomach, p. 14.)

GASTRIC ULCER.

The peculiar form of ulcer met with in the stomach is also seen in the duodenum and occasionally in the lower part of the œsophagus, and is analogous with the corroding ulcer of the uterus. In about four-fifths of all cases the ulcer is situate on the posterior wall at the lesser curvature and close to the pylorus (No. 3047); sometimes there is a corresponding ulcer of the mucous membrane on the opposite side of the organ, as if the first ulcer had infected the healthy mucous membrane in contact with it.

The ulcers vary in size, from that of a threepenny piece upwards; they are usually single, but may be multiple. In shape they are round or oval, with clean-cut edges, as if they had been punched out (No. 3048); where the ulceration covers a large area (No. 3049) it is frequently irregular, due, in all probability, to the coalescence of neighbouring foci of disease. Seen in vertical section the ulcer is funnel-shaped, the mucous membrane being most extensively destroyed (No. 3050).

The character of the base differs according to the depth to which the destructive process has extended; thus it may be formed by the submucous, muscular, or peritoneal coats, or the latter may have become adherent to some neighbouring organ and then have become destroyed (No. 3052).

In some cases no such adhesions form, owing to the rapidity of the process, and partly to the movements of the stomach, and when perforation occurs the contents of the stomach escape and set up acute general peritonitis (Acute Perforating Ulcer, Nos. 3049, 3450). This is more likely to occur in ulcers situated anteriorly.

Under appropriate treatment these ulcers may cicatrize at any period of their formation (Nos. 3051, 3053, 3055). If the ulcer was small the cicatrix is slightly depressed in the centre, and is surrounded by radiating folds of puckered mucous membrane (Nos. 3051, 3053). If large, cicatrization may give rise to large cord-like bands, which narrow the lumen of the organ, giving rise to hour-glass contraction (No. 3055).

Cancer occasionally arises in the cicatrix. Even when cicatrization might reasonably be supposed to be complete, relapses are by no means infrequent, consequently treatment should be continued for a considerable time after the cessation of symptoms.

When the ulceration has extended deeply, severe and even fatal hæmorrhage may occur from destruction of one of the large arteries (Nos. 3046, 3047, 3048); in some cases hæmorrhage occurs from distended varicose veins in the neighbourhood of the ulcer. Aneurysmal dilatation of the vessels in the base is uncommon, although occasionally met with. They are extremely dangerous, giving rise to fatal hæmatemesis (No. 3045).

Ulcer of the stomach is a common disease, principally occurring in women (No. 3050), in young adult life (No. 3047), and frequently in association with severe anæmia.

The real cause of their occurrence is uncertain; they have been attributed to self-digestion of the organ either from an increased acidity of the gastric juice or from a diminution in the alkalinity of the blood circulating in the walls of the stomach.

Embolism of some branch of artery may, by cutting off the supply of blood to a certain area, contribute to self-digestion of that area.

Virchow states that "gastric ulcer is due to a great variety of causes, all of which act by interrupting the circulation in circumscribed areas of the wall of the stomach."

Extensive burns of the skin occasionally produce ulceration of the duodenum, and sometimes of the stomach. This has been attributed to the interference with the circulation from the depressed action of the heart (No. 3053, and Surgical Catalogue, Nos. 1055, 1056).

Gastric ulcer has also been met with in cases of trichinosis, and is supposed to be due to gastritis set up by the irritant effects of the Trichinæ.

3045. An ulcer of the stomach with an aneurysmal dilatation of a branch of the coronary artery, the aneurysm bursting into the floor of the ulcer.

The ulcer is situated about two inches from the œsophageal opening, and just in front of the attachment of the small omentum. It is oval in shape, very small, and quite shallow, with a smooth floor; it is, in fact, the merest surface-lesion. At the larger end of the oval is a circular hole surrounded by a raised ring, which projects about $\frac{1}{10}$ inch above the surface. This is the mouth of a short channel which pierces the wall of the stomach, and opens directly into one of the main branches of the coronary artery.

The specimen must be regarded as one of aneurysmal dilatation in the floor of a gastric ulcer—a very rare condition. The aneurysm, which has burst, originated, without doubt, at a time when the ulceration was in active progress, and had led to the exposure and implication of the vessels. A weak spot in the arterial wall then gradually yielded under the distending force of the blood-pressure, and ultimately the sac ruptured.

It is noticeable that the aneurysm, once started, progressed, although the ulceration which caused it has all but healed. 4185

3046. A portion of a stomach, showing an ulcer situated in the lesser curvature about $1\frac{1}{2}$ inches from the œsophagus. The ulcer is very deep, with sharply-cut abrupt edges, which are at one part much undermined. The floor is tolerably smooth, and is perforated at the upper part by an oval aperture with clean-cut edges (? artificial; there is very little history to the specimen, and in the MS. Catalogue no mention is made of this opening); to the right of this, and lower down, is a smaller opening, circular, and with smooth, somewhat raised borders; this cannot be directly traced into an artery, but a branch of the coronary runs so very close to it, that a communication is probable, especially as the patient died from profuse hæmatemesis. A bristle marks the course of the coronary artery. 2128

3047. The pyloric end of a stomach, showing an ulcer on the posterior wall.

The ulcer measures $\frac{3}{4}$ by $\frac{9}{16}$ of an inch in diameter. It is oval in shape, and deeply cut with smooth and overhanging margins. The floor is uneven, and the orifices of three arteries of considerable size open on the surface. The floor is formed by omental or mesenteric tissue, the walls of the stomach having been completely perforated. The main trunk of the artery, of which the eroded vessels are branches, has been dissected out. From its size, it must be one of the main branchings of the cœliac axis, probably the coronary. 1361

History.—The specimen is from a youth. There was præcordial pain, with severe attacks of vomiting brought on by food, with occasional hæmatemesis, the blood being clotted. Death resulted from the repeated hæmorrhages.

Besides the above conditions a small aneurysmal sac, the size of a pigeon's egg, was found in connection with the aorta. Its cavity was filled with blood-clot, and the neck, which was small, was covered with a fine membrane. During life the pulse was weak and fluttering, and the heart was thought to be diseased. The sac of the aneurysm was partly calcareous.

It is probable that the cure of the aneurysm was in part, at least, dependent upon the diminished force of the blood-current produced by the repeated hæmatemesis.

3048. A portion of a stomach, showing a gastric ulcer which has extended through the coats of two vessels. The ulcer is situated about $2\frac{1}{2}$ inches from the pylorus; it is oval in shape, and measures 1 inch by $\frac{3}{4}$ inch. It is quite shallow, with clean-cut edges and smooth floor. Bristles have been passed into the orifices of two large vessels, opening on the floor. Posteriorly, these eroded vessels have been dissected out, and are seen to be large arterial branches, probably from the coronary. 2409

3049. A portion of the stomach, showing extensive superficial ulceration of the mucous membrane, most marked in the middle and along the lesser curvature, where it reaches nearly to the œsophagus. In the middle there is also some deep

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ulceration, and at two spots close to the lesser curvature, one in front and the other behind the attachment of the small omentum, perforation has taken place. The walls of the stomach are in places greatly thickened, especially over the ulcerated area. A chain of much-enlarged glands extends along the lesser curvature towards the œsophagus. 2240

3050. A portion of the cardiac end of a stomach, showing an ulcer which has led to perforation. The ulcer is situated near the left-hand lower corner; the larger opening is the œsophageal.

The ulcer is funnel-shaped, the mucous membrane being more extensively destroyed than the peritoneum; the muscular coat cannot be distinctly made out. The edges are on one side very abrupt and distinctly overhanging, on the opposite they are sloping. The actual perforation is nearly circular, and looks as if cut out with a punch. The walls of the stomach in the neighbourhood of the ulcer are greatly thickened. There is no obvious roughening of the peritoneum round the perforation. 687

History.—The specimen is from a girl who, without any previous alarming symptoms, was seized with excessive pain in the abdomen, and died in a few hours.

3051. A piece of a stomach showing a perforating ulcer at one part, and the cicatrix of former ulceration at another.

The ulcer is oval, measuring $1\frac{3}{8}$ inch by $\frac{3}{4}$ inch in diameter, the edge and floor are smooth. It is for the most part shallow, but towards either end it deepens, and at one actually perforates the coats by a small oval opening, whilst at the other the thin serous coat alone remains. Near the perforation the edges are more abrupt and clean-cut, at the opposite side they are more shelving. The surrounding mucous membrane is normal. On examining the posterior surface it is seen that the ulcer crosses the line of attachment of the small omentum, and that this forms a great part of the thickness of the floor.

In the same line with the ulcer, but a little below it, is the scar before mentioned. This appears as a thin translucent spot, with radiating puckering of the mucous membrane. Near one end of it is a very thin transparent area, over which the mucous membrane is not quite healed. The peritoneal surface over the scar is somewhat roughened. 1796

History.—From a patient æt. 38, who died from repeated hæmatemesis. At the post-mortem it was found that perforation had occurred.

3052. A portion of the stomach, showing a large oval ulcer, which has perforated the walls and caused adhesion to the liver and pancreas, which form its floor.

The ulcer measures 3 inches by $1\frac{1}{4}$ inch; its edges are smooth, sharply defined, and overhanging in places, shelving in others. The left lobe of the liver is firmly bound to the stomach, and with the adherent pancreas forms the base of the ulcer; these organs do not appear to have been themselves affected. An incision carried through the floor of the ulcer shows that one half is formed by liver the other by pancreas. 2133

3053. A portion of the stomach of a boy, showing the cicatrix of a healed ulcer, consequent on an extensive burn. A series of radiating folds and puckerings mark the site of the cicatricial contraction. At the point of convergence of the folds there is still a slight loss of substance, the ulcer not being quite healed. The rest of the mucous membrane and the peritoneal coat are normal. 2381

3054. A portion of the stomach, showing hourglass-contraction. The constricted portion of the organ is nearer the pyloric than the œsophageal opening: it forms a short tube about an inch in length, and only just exceeding the œsophagus in diameter. There are but slight marks of puckering externally, and the walls of the tube do not feel thicker than elsewhere. Internally, the mucous membrane is thrown into strongly-marked longitudinal folds. In the tube there is, posteriorly, a small oval perforation with sharp abrupt edges; the opening on the peritoneal aspect is nearly as large as that in the mucous coat. The perforation has occurred just below the attachment of the small omentum. The stomach on either side of the constricted portion appears generally healthy; there is no evidence of dilatation or thinning of the walls. In the cardiac portion the mucous membrane is very rugose, except along the lesser curvature, at which part about an inch from the constriction the surface is less rugose, and there is some radial puckering suggestive of former ulceration.

On the peritoneal surface, especially at the cardiac end, there is a thin layer of recent lymph. 4043

History.—Mary B. æt. 28, admitted into University College Hospital, under Dr. Parkes, July 1st, 1850. Two years before, there was pain and vomiting after food. She had lately complained of pain in the left side and chest, and on June 29th was suddenly seized with violent abdominal pain followed by continued vomiting. Bowels constipated. Suppression of urine till July 1st, when she passed a pint of dark offensive urine. There was well-marked collapse: respirations 60, pulse 140 and very feeble. The abdomen was distended, hard and tender, and there was paroxysmal pain.

Post-mortem Examination.—There was general peritonitis, most marked in the upper half of the abdominal cavity, which contained 38 ozs. of reddish purulent fluid. The stomach was adherent to surrounding parts by recent and old adhesions. Posteriorly, between the layers of the omentum, was a cavity filled with the contents of the stomach, and communicating with its interior by the perforation shown in the specimen. Other organs healthy. *Vide* Dr. Parkes' *Case-Book*, p. 80 (1850).

3055. A stomach which has been laid open along its small curvature. There is hourglass contraction, the point of stricture being nearer the cardiac than the pyloric end. At one part is a puckered and depressed cicatrix, from which the rugæ radiate. The walls of the stomach are thick, but it is otherwise healthy. The serous coat is normal. 5513

For wax models of Gastric Ulcer, see page 142, *Nos.* 3578, 3579.

Cancer of the Stomach.

Cancer (usually of the scirrhus variety) is extremely commonly seen in the stomach. It is most usually seen at the pylorus (No. 3056), but may occur in any part, or may be diffused over a large area of the stomach-walls (No. 3060). If it occurs at the cardiac orifice, it probably always originates in the œsophageal epithelium, and is a squamous epithelioma. (*Vide* Surgical Catalogue, Part I. p. 199.)

In some cases the growth undergoes colloid degeneration, and may then grow rapidly and with great exuberance, and affect the omentum, peritoneum, liver, and other abdominal viscera (Nos. 3058, 3060, 3061).

The growth may originate in the cicatrix of an old ulcer, or may be associated with ulcer, although growing apart from it (No. 3057). It has a great tendency to grow all round the pylorus, and so cause great obstruction (Nos. 3056, 3059); this at first produces hypertrophy of the muscular coat, but it is soon followed by atrophy and dilatation of the stomach (No. 3059).

Pyloric cancer is almost always sharply defined on the duodenal side, but much less so on the stomach side. Pointed villous growths or nodular excrescences may be seen on the surface of the cancer.

A section through the mass shows that the submucous and muscular coats are increased in thickness; opaque bands of cancer alternate with transparent bundles of muscular tissue.

The growth soon ulcerates and gives rise to hæmorrhage, but this is not so constant or profuse as is seen in cases of gastric ulcer (No. 3058).

The tumour is usually not very large—about the size of a Maltese orange—and is frequently concealed by the liver, to which it becomes adherent.

If no adhesions are formed, the weight of the cancer drags the pyloric end of the stomach downwards, and it may even reach the brim of the pelvis. Perforation of the stomach may occur consequent upon the ulceration; it may lead to fistulous communications with the transverse colon or intestines, very rarely, indeed, through the abdominal wall. In other cases the growth may extend into the thoracic cavity, opening the pleural sac, and producing inflammation of it and of the lung.

Gastric cancer may prove fatal by hæmorrhage, but more commonly by starvation and pain.

Carcinoma of the body of the stomach is a protean affection both pathologically and clinically, and thus contrasts markedly with pyloric cancer, which is peculiarly definite; to find similar specimens of pyloric cancer is common, but this is not the case with cancer of the body of the stomach.

3056. The pyloric end of a stomach. There is a mass of cancer affecting the orifice, and the mucous membrane round this is superficially ulcerated, the margin of the ulcerated surface being well-marked and nearly circular in outline. 688

3057. A stomach laid open along its great curvature, and intimately adherent to the under surface of the left lobe of the liver by broad and firm adhesions. The pylorus and lesser curvature are implicated in a large mass of cancer, which in some parts is deeply ulcerated, the ulcers having indurated and overhanging edges. At one part the mucous membrane has been destroyed, and the coats rendered much thinner by simple ulceration; this area is smooth. The lymphatic glands on the under surface of the liver and surrounding the vessels are enlarged. A slice of the liver has been removed to show the secondary deposits in its substance; the largest of these is in one part undergoing colloid degeneration, having a typical honeycombed appearance. 1597

3058. The pyloric end of a stomach laid open along the small curvature. There is a large cancerous ulcer involving the whole mucous surface at the pylorus, but it does not extend into the duodenum. The ulcer is flattened on the surface, and reticulate, but the margins are raised. The growth has extended through the thickness of the walls, and forms raised patches on the peritoneal surface. Small cystic spaces can be seen on the cut surface; these are the enlarged alveolar spaces of the cancer, which is undergoing colloid change. Round the ulcerated area the mucous membrane is raised by thickening of the submucous tissue; the irregular patches are yellowish in colour, and very much resemble atheromatous patches seen in arteries. On cutting one of these across, it is found that the submucous tissue is the seat of an infiltration pure milk-white in colour. 2140

3059. The pyloric end of a stomach affected by malignant disease. A soft, fungating, cauliflower-like mass fills and distends the pylorus, and projects on the one side into the cavity of the stomach, on the other into the duodenum. A bristle has been passed through the pylorus, which is narrowed. The mucous membrane of the stomach is smooth, and the walls are thinned, owing to the chronic over-distension due to the obstructed pylorus.

Externally the parts round the pylorus are thickened. 1619

3060. A portion of a stomach, the walls of which are extensively invaded and thickened by colloid cancer. The mucous membrane at the cardiac end can be easily recognized, but at the pyloric end it has been destroyed, and the surface of the growth exposed.

The growth is gelatinous in appearance and spongy, in some parts closely resembling the corpus spongiosum penis. 2406

3061. A specimen of colloid cancer of the pyloric end of the stomach. The organ has so lost its shape and natural appearance that it cannot be recognized. The cavity is much contracted, and the whole wall replaced by cancer; at one part the remains of the muscular coat can still be seen. The inner surface has a reticulate appearance. The cancer is thick and of a gelatinous appearance; the alveolar spaces can be plainly seen. A portion of intestine is adherent to the mass, but its lumen is not narrowed. 1245

3062. The stomach of a child, part of the anterior wall having been removed to show a tumour springing from the lesser curvature about midway between the œsophagus and pylorus. It is much lobulated, and projects boldly into the cavity of the stomach, the attached part being the narrowest. The walls of the stomach for some distance round the pedicle are thickened by infiltration.

The mucous membrane is intact over the surface of the growth. At its periphery the tumour is soft, but it is firm in the centre. The growth is a round-celled sarcoma. 3867

For wax models of Cancer of the Stomach see page 142, *Nos.* 3580 *to* 3583.

Series XL.—DISEASES OF THE INTESTINES.

Diverticula of the Intestine.

A diverticulum from the lower part of the ileum is not uncommonly met with. It is the unobliterated remains of the vitelline duct. It is usually situate on the free border of the tube, and about two or three feet above the cæcum. The length of these diverticula varies considerably. They are usually of precisely the same structure as the wall of the intestine, and are liable to the same diseases. No. 3099 is a specimen of perforation of one of these diverticula, consequent on typhoid ulceration.

In cases of hypertrophy of the muscular coat of the colon, the mucous membrane may become pouched, the production of these pouches being analogous with the formation of sacculi in a hypertrophied and dilated bladder. (*Vide* Surgical Cat. Part II. pp. 317–319.)

3065. A piece of the small intestine, probably from the lower half of the ileum, which has been laid open along its mesenteric border, close to which is a diverticulum, measuring about an inch in length. About $\frac{3}{4}$ inch from the diverticulum, on its peritoneal aspect, is an oval cyst-like swelling, measuring $\frac{3}{4}$ by $\frac{1}{2}$ inch in diameter; in general appearance it closely resembles a large bulla. The wall consists apparently of peritoneum only. When the cyst was opened (some time after preservation in spirit) a thin fluid escaped. Attached to the outer surface of this is a long pedunculated cyst with thin flaccid walls, near the extremity of which is a solid flattened structure projecting, placenta-like, into its interior. The mucous membrane is smooth, but over an area corresponding with the base of the cyst there is superficial ulceration.

ENLARGEMENT OF THE ADENOID STRUCTURES OF THE INTESTINES.

The pathological significance of enlargement of the adenoid structures of the intestines is uncertain. It may be found in cases in which during life there were no intestinal symptoms. In infants these structures are normally very prominent; in advanced life they tend to atrophy. In cases of diarrhœa the adenoid tissue is often very prominent, and sometimes so after the administration of purgatives (No. 3069).

In Lymphadenoma (No. 3071 A) and Leucocythæmia the hyperplasia may run beyond the limits of the normal adenoid structures. No. 3070 is from a case of Addison's disease. Follicular enlargement and ulceration is met with in tubercular, typhoid and dysenteric ulceration of the intestines. (*Vide* pp. 18, 22, and 27.)

3068. A piece of small intestine showing enlargement of Peyer's patches and the solitary glands. 2102

3069. A piece of the colon, showing enlargement of the solitary glands produced by purgatives (Sir Wm. Jenner). With the aid of a lens minute erosions may here and there be seen; these correspond to the situation of the closed follicles. 4721

3070. The end of the ileum with the ileo-cæcal valve and a part of the cæcum, from a patient who died of Addison's disease. The mucous surface of the ileum is thickly studded with solitary follicles which attain the size of a large pin's head and project above the surface, the larger being distinctly pedunculated. Three Peyer's patches can be seen; their constituent follicles are slightly enlarged and prominent, but the change is not marked. 5236

History.—The patient was a man, æt. 31, admitted under Mr. Alexander Bruce, April 25th, 1866. He had the usual indefinite symptoms of Addison's disease—general asthenia, marked feebleness of the pulse, vomiting, and epigastric distress. There was no bronzing, but general pallor of the surface. Death occurred suddenly.

Post-mortem Examination.—Some puckering and induration at the apices of the lungs; on the right side a caseous nodule. The supra-renals on both sides were large, nodulated, and much increased in thickness; they were indurated, and on section showed yellow caseous nodules throughout, there was no distinction between cortical and medullary portions. The other organs were generally healthy. There was one patch of ecchymosis in the mucous membrane of the stomach near the cardiac orifice. The intestines were considerably injected, especially the valvulæ conniventes. The enlargement of the solitary follicles was general, but much more marked in the ileum. (*Vide* Path. Trans. 1865–1866, p. 401.)

3071. A piece of large intestine showing minute points of ulceration. The changes are only visible on close inspection, the mucous membrane appearing studded with minute pinhole openings. Normally there are no apertures on the mucous membrane visible to the naked eye. Similar changes are not uncommon in the large intestine associated with catarrhal or dysenteric symptoms. 6011

3071 A. A piece of large intestine, from a case of lymphadenoma. The solitary follicles are unusually prominent; they vary in size, from a split pea to a small pin's head; some of the larger ones show faint central umbilication, in others there is distinct loss of substance by ulceration in the centre. 5511

History.—Richard P., æt. 30, admitted under Dr. Bastian, Sept. 24th, 1880; died Oct. 19th. The usual signs of Lymphadenoma were present. The spleen became much enlarged, and was followed by enlargement of the glands of the groin, axilla, and neck. The white blood-cells were in the proportion of 22·5 per cent. Pyrexia of a broken type was present, the temperature never went above 102°. Death occurred suddenly.

Post-mortem Examination.—The spleen, liver, and kidneys were enlarged and showed numerous foci of lymphoid tissue overgrowth. In addition to the glands already mentioned as being enlarged, the mesenteric, tracheal, bronchial and mediastinal glands were also diseased. The colon was affected, as shown in the specimen.

DYSENTERY.

Dysentery is a miasmatic disease occurring in an epidemic, endemic or sporadic form, and most probably dependent upon the presence of a micro-organism. The epidemic form is alone contagious. The morbid anatomy of the different forms is probably identical, and the difference principally one of intensity and distribution.

Dysentery is characterized by inflammation of the mucous and submucous coats of the gut, which may occasionally spread deeper still. The inflammation occurs in two forms, either catarrhal or sero-purulent, or secondly, diphtheritic or fibrinous.

1. The first kind has also been called follicular ulceration by Rokitansky. The injected mucous membrane is beset with minute blackish-red points chiefly seen on the valvulæ conniventes. Later on the swollen mucous membrane becomes paler, and the submucous coat is much thickened by sero-purulent exudation (No. 3075). A minute hole may be present over the follicle (No. 3072). Should the disease progress still further, the mucous membrane becomes extensively destroyed by ulceration (Nos. 3074, 3075), but island-like patches remain here and there covered with a tough pellicle of mucus and fibrine (No. 3084). The muscular coat becomes swollen and infiltrated with pus. Should recovery occur the ulcerated portions undergo cicatrization, and the mucous membrane which has not been destroyed remains in patches.

2. In the diphtheritic or fibrinous form the great intestine and perhaps a few coils of the ileum become injected. The mucous membrane is traversed by irregular tracts of a dark red or black colour (No. 3080), which are studded with small nodular elevations (No. 3078). The coats of the bowel are much thickened; the muscular coat is intact, but owing to the pressure exerted by the fibrinous exudation, the mucous and submucous become atrophied or incorporated with the effusion.

Hæmorrhages occur into the thickness of the gut and also into the exudation. Should a patient survive, perforation or gangrene of the gut-wall ensues (Nos. 3083, 3084). It is usual to find in post-mortem examinations that the two forms of dysentery are combined, so that at one part the walls may be much thickened by fibrinous exudation (No. 3085).

Should the patient recover from the immediate effects of the sloughing the resultant ulcers may persist, and may eventually lead to perforation (Nos. 3084, 3085) or to simple fibrous stricture. The condition produced by these ulcers is known as Chronic Dysentery.

As secondary changes in dysentery, may be mentioned catarrh of the upper part of the alimentary tract, abscess of the liver, and local or general peritonitis.

3072. Follicular ulceration of the large intestine from a boy suffering from dysentery. The whole mucous surface of the gut appears minutely pitted, or as if worm-eaten; the mouths of the pits present clean-cut edges, even when viewed with a lens. Blocking the pits, but sunk beneath the level of the surface, minute white plugs may be seen in many cases. The surface generally of the mucous membrane is smooth.

Examined microscopically the material plugging the pits and deposited on the surface shows round cells entangled in a fibrillated network. 2127

3073. A portion of the colon which has been laid open. The mucous surface is studded with small pits surrounded by a slight elevation marked off from the rest of the surface by a circular groove; these are the lymphoid follicles with a central pit which has resulted from their necrosis, after being swollen by inflammatory exudation. In addition the surface is rendered rough by exudation on to it; where the exudation has been removed by ulceration in the progress of the disease the lymphoid follicles are seen. The walls of the gut are slightly thickened and indurated by inflammatory effusion. The specimen illustrates the early changes met with in dysentery. 2271

3074. A piece of the colon which is the seat of ulceration, probably of dysenteric origin. The ulcerative process, although comparatively superficial, has destroyed the greater part of the mucous membrane. The ulcers are irregular and sinuous, with sharply defined edges, which here and there are somewhat overhanging. The floor is uneven. There is no appearance of infiltration of either borders or base; the peritoneal surface is smooth. The walls of the gut are thickened, the increase apparently affecting all the coats. 1451

3075. A portion of the large intestine, showing ulceration, probably dysenteric in nature. The mucous membrance over the whole piece of gut is very extensively ulcerated. The ulcers vary much in size; for the most part they are rounded in outline, but some of the larger patches are irregular, apparently from the confluence of neighbouring ulcers. There is no induration of the margins or base; the edges are in many cases sharply cut, and the floor somewhat ragged in appearance. The thickness of the walls of the gut is increased, this affects principally the mucous and submucous coats. The peritoneal coat is slightly roughened; the ulceration is, for the most part, superficial, the submucous coat forming the floor and giving it the ragged appearance. The condition here present would correspond most closely with the follicular ulceration described by Rokitansky, which begins in the closed follicles, and by the coalescence of adjacent small ulcers may lead to extensive ulceration of the mucous membrane. 1374

History.—The patient came home from India and died of fever; no further particulars are obtainable.

3076. A piece of large intestine from a case of dysentery. The inner surface is irregular and roughened from ulceration of the mucous membrane; this is most extensive in the sulci between the rugæ. The ulceration does not at any part extend deeper than the submucous coat. The peritoneal surface is quite normal in appearance. The wall of the gut is much thickened. 4832

3077. The end of the ileum with part of the colon showing extensive ulceration, probably of dysenteric origin. The cæcum and ascending colon are the parts most severely affected, but the ulceration has also spread into the vermiform appendix, as far as the tip, and has further affected the ileum for a few inches above the ileo-cæcal valve. The parts most affected—cæcum and ascending colon—show the entire inner surface of the gut roughened and almost shaggy; nowhere is there a trace of normal mucous membrane. The ulceration does not extend in depth beyond the submucous coat. The thickness of the wall of the gut is much increased. The peritoneal surface is quite smooth.

The specimen illustrates a superficial form of ulceration occurring in dysentery, and involving a large extent of surface extending into the ileum. 4828

3078. The end of the ileum, with the cæcum and part of the colon, from a case of dysentery. The mucous surface of the large intestine is thickly beset with wart-like projections. This has resulted in part from superficial but very irregular ulceration, in part from marked hypertrophy of the portions of mucous membrane still persisting. These latter take the form of small polypoid or pedunculated tags which, on close examination, are seen to have a spongy texture. The other coats of the gut do not present anything abnormal. The vermiform appendix, much dilated at its proximal end, shows the mucous membrane to be slightly altered; the distal end is nearly obliterated. The ileum appears quite normal and contrasts very strikingly with the condition of the colon. 5854 A

History.—W. W., æt. 28, was admitted into the Hospital, Sept. 1st, 1882, he died on the 7th. Three or four years before he had had bloody diarrhœa, lasting some months. He had never been abroad. On admission there was bloody diarrhœa, accompanied by pain and tenderness along the line of the colon, and occasional vomiting. Congestion of the lungs occurred. The temperature was usually normal, but occasionally rose to 100° or 101° F.

At the *post-mortem examination* it was found that the entire colon and rectum was affected, as shown in the specimen. The mucous membrane was deeply pigmented.. There was no peritonitis. The lungs were congested, and there was acute bronchitis; in the upper lobe of the right lung were two gangrenous cavities, probably of embolic origin. (*Vide* Dr. Ringer's *Case-book*, Males, p. 661, 1882.)

3079. Two portions of the colon from the same case as the preceding. One piece shows very irregular ulceration of the mucous membrane, associated with marked spongy hypertrophy. In the other piece there is uniform spongy hypertrophy, but no evidence of ulceration; the aspect of the mucous membrane resembles in places the fine sponge-work of a coral. 5854 B

3080. The cæcum and part of the colon from a man who died of dysentery. The entire length of the gut is similarly affected, but in the cæcum the disease attains its maximum: here the swelling is extreme, the surface presenting prominent thick fleshy folds with deep intervening furrows. In the recent state the surface was of a greyish black, or in places coal-black colour, but immersion in spirit has removed the colouring-matter. In the recent state the surface is said to have been covered by a coating of greyish fibrine, which was thickest over the most prominent portions of the folds. The vermiform appendix also showed the discoloration. The peritoneal surface is smooth and the muscular coat thickened; but the great mass of the folds is made up by mucous and submucous coats.

The specimen shows a high degree of inflammation, which would probably have speedily induced gangrene. 3726 A

History.—Philip Hall, æt. 41, was admitted into University College Hospital on the ninth day of his illness, previous to which he had been in good health. The onset was sudden, with severe abdominal pain, griping, tenesmus, and frequent desire to defæcate, the stools consisting of almost pure blood. The abdomen was very tender. Death occurred three days after admission, the symptoms continuing, and being accompanied by tympanites and marked prostration. No mention is made of the temperature.

At the *post-mortem* recent lymph was found between the omentum and colon; the peritoneum was injected. The mucous surface of the lower three feet of the ileum and of the great intestine was injected and swollen.

The viscera were normal. (*Vide* Dr. Walshe's *Case-books*, vol. iii. 1847.)

3081. A piece of small intestine from the same case as the preceding. The mucous membrane is superficially ulcerated, and the valvulæ conniventes are covered over and rendered rough by a fibrinous deposit. 3726 B

3082. A portion of the ileum with the caput cæcum coli showing extensive ulceration of the mucous membrane of both large and small gut. That in the ileum is most marked just above the ileo-cæcal valve, and again some two fingers' breadth higher up; in addition there are small ulcerations varying in size, but generally circular in outline. Most of the ulcers are sharply cut, with free floating edges. The bases are not infiltrated, nor does the process extend beyond the submucous coat. The condition is probably dysenteric from its general characters, although the situation would accord with typhoid. The absence of infiltration of the edges and bases of the ulcers in the ileum is against their having a tubercular origin. 1383

3083. A piece of large intestine showing two rounded perforations having fairly smooth edges. The mucous membrane round them is widely but quite superficially ulcerated.

The peritoneal surface presents films and shreds of exudation most marked in the neighbourhood of the perforation. 694

3084. Part of the sigmoid flexure and descending colon, showing dysenteric ulceration. The ulceration is very extensive and deep.

At one end of the specimen the mucous membrane is still intact; but over the rest it only persists in small insular patches standing out very prominently above the denuded surface.

These islands, which present an almost polypoid appearance, are arranged in three-fold series along the gut, corresponding to the sacculated intervals between the longitudinal bands of muscular fibres.

In depth the ulceration has for the most part proceeded to the extent of destroying the mucous and submucous coats, the transverse muscular fibres being laid bare; here and there the process has gone deeper, and in some parts the peritoneum alone remains intact. At one spot, indicated by a piece of blue glass, perforation has occurred. The subperitoneal fat is abundant, but the surface is nowhere roughened by adherent lymph. 4066

History.—John Thomas, æt. 29, was admitted into University College Hospital on April 3rd, 1852. In December 1851 there was an occasional discharge of blood per rectum, but there were no accompanying symptoms. The hæmorrhage continued and became more frequent and profuse, and was sometimes accompanied by griping pains, but never by straining. By March 19th the stools were very frequent, sometimes 20 in 24 hours.

On admission there was a blotchy cutaneous rash over the trunk and lower limbs, in some parts covered with superficial crusts. The abdomen was retracted; and there was tenderness in the left iliac fossa, the left flank, and about the umbilicus. There was a deep but callous fissure of the anus, but no piles. Deep ulceration of the sides of the tongue, mucous surface of the lower lip, and of the hard palate and anterior pillars of the fauces.

On April 6th there was severe abdominal pain, followed by bilious vomiting. The next day there was sudden and severe pain in the right iliac fossa, and subsequently in the umbilical region. The patient became collapsed, and died at 4.30 P.M.

Post-mortem Examination.—There was recent general peritonitis; the abdomen contained six or eight ounces of turbid brownish fluid, but no distinctly fæcal matter. There were six or eight perforations of the colon. The small intestine was healthy, except for some prominence of the solitary glands in the lower end of the ileum. The mucous membrane of the large intestine was extensively ulcerated and of a sooty colour; in the lower third of the rectum the ulceration was less marked. There was also a large ulcer at the lower end of the pharynx.

Vide Dr. Parkes's *Case-book* (Males), 1851–1852, p. 236.

3085. A specimen of dysenteric ulceration with perforation of the colon. The degree of ulceration is extreme; there are only mere traces of a smooth atrophic mucous membrane; the rest of the surface is eroded to a varying extent, and shows, according to the depth to which the process has extended, the submucous, muscular, or peritoneal coats in the floor of the ulcers. The peritoneum is exposed very extensively, and exists only as a thin transparent membrane. At two spots perforation has occurred. It is noticeable that the mucous membrane is preserved opposite the longitudinal bands of muscular tissue, the sacculated portions of the gut having suffered most.

There is no thickening of the walls of the gut at any part. 2126

3086. The cæcum and part of the colon from a case of dysentery proving fatal by pyæmia. The mucous membrane is extensively ulcerated; the ulcers in the lower end of the specimen (colon) are clean cut as if punched out, and are separated from one another by narrow tracts of mucous membrane. The walls of the gut are thickened. 6492

History.—Charles Macklin, æt. 26, a railway porter, was admitted into the hospital under Dr. Bastian on July 7th, 1889. He complained of cough and blood-spitting, which began about three weeks previously. He had had dysentery when in India ten years ago. Family history good. While in the hospital he spat up five or six ounces of bloody mucus daily, and for the first two or three days had slight diarrhœa. He complained of pain on the right side of the chest, necessitating morphia injection. On July 30th he complained of severe abdominal pain; the hæmoptysis continued in spite of the usual remedies; cough very troublesome. On August 7th the chest was examined (owing to the general condition of the patient this had not been previously done); in the lower half of the right axilla there was complete dulness. Vocal fremitus and breath-sounds deficient at right base. On 15th he spat up eight ounces of bright-red blood. On 30th there was absolute dulness below the right fifth rib; in the third space there was a hyper-resonant note, like percussion over the colon. The liver extended downwards to within two fingers' breadth of the umbilicus; it was very tender.

Sept. 17th. Marked fulness of the chest over the right base, with œdema in the axillary line. Sept. 18th. Aspiration in the mid-axillary line, sixth right interspace, brought away seventy-nine ounces of blood-stained pus of a greenish colour; in the evening there were all the signs of pneumo-thorax. Sept. 19th. Eighty ounces of reddish pus removed by aspiration. Sept. 26th. Mr. Pollard performed Estlander's operation for empyema; sixty-four ounces of pus evacuated; temperature 98°. Oct. 1st. Discharge less in amount, but very fœtid. Oct. 4th. Diarrhœa, some of the motions consisting of blood-stained mucus only. This continued with varying severity until Oct. 10th, when the patient died.

Post-mortem Examination.—Left lung emphysematous, otherwise healthy. Pleural cavity normal. Right lung firmly adherent at upper and front part. In its base is a suppurating cavity communicating with an abscess-cavity in the liver through a perforation in the diaphragm. Pleura very much thickened. (For the condition of the lung and liver, *vide* No. 3133.) Spleen rather firmer than natural. Kidneys congested; the left contains five or six pale areas, as if from inflammatory infiltration. Supra-renals and pancreas normal.

Intestines slightly congested, but not ulcerated until within two inches of the ileo-cæcal valve. The cæcum, colon, and rectum are extensively ulcerated and thickened, the ulcers being covered with a blackish kind of lymph. The ulcers are many of them clean cut, others irregular. At the anus the ulceration is very much more extensive than in the rectum or sigmoid flexure.

(*Vide* No. 3133, also Dr. Bastian's *Case-books* for 1889.)

3087. A portion of the mucous and muscular coats of the large intestine, which was voided *per rectum* seven months after some febrile attack, the precise nature of which is not stated in the MS. Catalogue. The specimen is ragged, and there is no trace of its normal structure. 3607

TYPHOID FEVER.

Typhoid fever is an acute infective disease dependent upon a micro-organism which undergoes development partly in the body and partly outside: it is therefore one of the so-called contagious miasmatic diseases. The effects of the fever are partly dependent upon the specific pathological changes found in the alimentary tract and partly upon the deleterious influence of the poison or poisons circulating in the blood; consequently the amount of disease found in the intestines is frequently far short of what might have been expected from the severity of the symptoms.

The disease is characterized by inflammation and ultimate necrosis of the lymphatic tissue in the intestinal tract, viz. Peyer's patches and the solitary glands, combined with secondary changes in the mesenteric glands (No. 3094), spleen, and other organs. The morbid changes especially attack the jejunum and ileum, but not uncommonly spread to the colon (No. 3095), being then chiefly confined to the cæcum, but in rare cases extending much further and even reaching to the rectum.

The processes may be conveniently described as occurring in four stages, corresponding to four weeks of the disease:—

i. *Stage of Enlargement.*—In this the solitary and agminated glands become much swollen by inflammatory exudation (No. 3088, 3091): this does not occur in all at once, but, usually affecting those near the ilio-cæcal valve first, successively attacks fresh patches. The swelling attains its maximum about the ninth day of the disease.

The mucous membrane and peritoneum over the enlarged patches are injected.

By French authors two kinds of diseased patches are described. Thus Louis speaks of the "Plaques molles" and the "Plaques dures" (No. 3090): but it would appear that the difference is rather one of degree than of kind, since gradations between them are met with, and they constantly coexist, the "plaque dure" being due to more intense and prolonged inflammation, or at least to the production of a firmer, more fibrinous, and less cellular exudation. In some instances there is coagulative necrosis.

ii. *Stage of Ulceration.*—In mild cases ulceration need not occur, the inflammatory products being simply reabsorbed. When, as is usually the case, ulceration occurs, the affected patch undergoes necrosis and separates as a slough (No. 3091). This occurs first in the patches first affected, *i. e.* near the ileo-cæcal valve (No. 3091). The depth to which this goes and its effects will depend upon the intensity of the process. Thus, if the submucous and muscular coats are affected, large vessels may be opened and fatal hæmorrhage result, or in worse cases actual perforation may occur.

iii. The ulcers are more or less characteristic; they are rounded or oval, and their long axis corresponds with that of the gut (No. 3096). The edges are undermined (No. 3097), and the slough is of a yellowish-brown colour, probably largely from admixture with bile. The ulcers are larger, and more numerous near the ileo-cæcal valve than elsewhere, and those attacking Peyer's patches lie in the mesenteric border of the gut. When the slough has separated there is little or no contraction left, contrary to what is seen in tubercular ulceration (No. 3096).

iv. Cicatrization usually begins sometime during the fourth week of the disease, and probably requires two weeks for its completion.

The ulcer heals by granulation in the usual way, but the gland-structure is of course permanently destroyed—a fact which may possibly account for the protective influence of one attack of typhoid. In the rather rare cases of death from relapsing typhoid, healed ulcers, or ulcers nearly healed, are seen, and these are almost always nearest to the ileo-cæcal valve, having probably been the seat of ulceration in a previous attack; ulcers going through the necrotic stage may be found in all the perfection of a recent attack further away from the ileo-cæcal valve. It is said that the cicatrix may become coated with villi (Rokitansky).

The cicatrix is slightly depressed, firm, and smooth, and the wall of the gut at this part is thinner than elsewhere. Cicatrization of typhoid ulcers hardly ever leads to narrowing of the gut, nor is the mucous membrane round it puckered (Nos. 3097, 3099).

Perforation occurs most commonly in the ileum. It may result either from an extension of the ulcerative process, or the sloughing may extend to the peritoneum, in which case the opening is large. A third way in which perforation occurs is by rupture of the peritoneum, which has lost all support; in these cases the rupture usually appears as a linear rent, usually in the direction of the length of the gut. The number of perforations varies: usually there is only one; but as many as twenty-five have been recorded.

Rupture of the bowels leads, in the majority of cases, to death from peritonitis set up by the extravasated contents of the gut (No. 3097). Peritonitis may also occur independently of perforation. In some cases, owing to the adhesions of the peritoneum to surrounding parts, the inflammation may be circumscribed; in others the adhesions prevent any serious peritonitis, and lead to permanent cure.

In addition to the changes described as occurring in the intestines, the mesenteric glands become the seat of morbid processes (No. 3094). Coincidently with the stage of enlargement of the glands of the intestines, the mesenteric glands enlarge, and continue to do so until the sloughs begin to separate from the ulcers; resolution then gradually takes place. The affection of the glands is largely due to the irritation caused by the absorption of the poison.

In some cases, towards the end of the second week, purulent centres appear in these glands, and suppuration may occur around them. The disease of the glands corresponds in amount to the disease of the gut in their neighbourhood, and is consequently usually most marked near the ileo-cæcal valve.

The spleen is enlarged; no acute fever has so much power of enlarging the spleen as typhoid. It soon loses its consistency, partly from paralysis of its muscular tissue. Hyperæmia and congestion are found in the liver and gall-bladder and, occasionally, also in the pancreas.

In rare cases inflammation and ulceration occur in the stomach, œsophagus, and pharynx. These changes are seldom met with before the end of the third week, and are not always characteristic of typhoid, being sometimes the result of some general condition rather than of a specific poison. They are met with in typhus and other diseases.

In typhoid, as in other infective processes, inflammation may attack the joints, lungs, pericardium, meninges, and other parts of the body.

The muscles and muscular substance of the heart undergo changes precisely similar to those met with in typhus or any prolonged and severe febrile attack. They are softer and paler than natural, having undergone granular and hyaline or waxy degeneration; the degenerate fibres may rupture and extensive extravasation ensues; this transparent degeneration hardly ever shows the iodine reaction of lardacein.

3088. A portion of the ileum from a child aged six, who died from typhoid. The solitary and agminated glands are swollen; the former are few in number, and attain the size of a split pea; the latter form large oval plaques arranged in linear series. The largest plaque measures about $1\frac{3}{4}$ inches by $\frac{3}{4}$ inch in breadth, and rises abruptly from the surface to the extent of a line. Superficial necrosis has occurred in the plaque and also in the larger solitary follicles. The mucous membrane surrounding the ulcerated patches is apparently healthy, and the peritoneum quite smooth.

The stage would correspond to about the end of the second week, the time at which the slough forms immediately after the maturation of the plaques. 4118

3089. The lower end of the ileum with the ileo-cæcal valve. The agminated glands, for the extent of nearly five inches above the valve, form one continuous tract of swelling. The swollen surface is very irregular, and in many parts is minutely pitted. Above this part the swollen solitary follicles are seen rather sparsely scattered; near the upper end is a swollen Peyer's patch.

The wall of the gut, where there are no ulcers, is very thin, the muscular coat having undergone atrophy.

The disease was probably in the middle or end of the second week. 1794

3090. A portion of the ileum from a case of typhoid fever. Two Peyer's patches are seen to be swollen, and between them are two enlarged solitary follicles.

The swollen Peyer's glands are examples of the " plaque dure;" the upper one is slightly worm-eaten from ulceration, the lower shows in two places a more advanced condition.

The changes are probably those occurring at about the end of the second or beginning of the third week of the fever. 1822

3091. The lower portion of the ileum with the ileo-cæcal valve. The solitary glands and Peyer's patches of the whole piece of gut are enormously swollen: the maximum change is seen just above the valve, at which point the swollen plaques project for $\frac{1}{4}$ or $\frac{1}{3}$ of an inch above the surface, and involve nearly the entire circumference of the gut. Immediately below this, on the cæcal aspect of the valve, the mucous membrane appears almost normal. Some of the swollen patches show commencing necrosis in the shape of adherent sloughs: others, again, are pitted and worm-eaten on the surface, owing to the separation of sloughs; this erosion is quite superficial, and is best seen in the neighbourhood of the ileo-cæcal valve.

The specimen illustrates the changes seen about the middle or end of the second week of typhoid, and shows the extreme degree of swelling which may occur, to the extent even of producing marked temporary stenosis. 4376

3092. A portion of the ileum from a case of typhoid fever. The solitary follicles project from the surface as small hemispherical nodules, varying in size up to that of a lentil; most of them show a small central erosion, giving them an umbilicated appearance. The most striking changes are, however, in the agminated glands, which stand out abruptly from the surface as flat more or less circular swellings at the free border of the gut. In the upper part the patches are smaller and circular in outline, but in the lower there is one large plaque, oval in shape, with the long axis in that of the gut. The abrupt margin of each plaque is a line or more in thickness, and there is an appearance of slight constriction round the base, due to the overhanging of the edge. The free surface of the diseased patches is eroded, especially in the upper and lowermost; this erosion is very deep in parts, as may be seen by holding the specimen against the light.

The conditions seen in the specimen would correspond to about the end of the second week of the disease. 4818

3093. A piece of the lower end of the ileum from a patient dying from typhoid fever. The changes present closely resemble those described in No. 3092.

The affected Peyer's patches are examples of the "plaque dure." The conditions would correspond with the end of the second week, when the sloughs are beginning to separate. In one ulcer this separation has taken place. 4831

3094. A portion of the ileum which has been laid open, the mesentery remaining attached in order to show the swelling of the mesenteric glands. These constitute a large nodulated central mass surrounded by several single enlarged glands. The consistence of the mass is soft, almost fluctuating over the most prominent parts. An incision into the mass shows the interior to be soft and pulpy. The Peyer's patches and solitary glands are prominent and reticulate on the surface, being pitted and worm-eaten. The condition would correspond with the latter half of the second week. The reticulate appearance is due to the unequal infiltration of the patches, and the pitting is probably due to commencing resolution with partial or unequal absorption, or to the bursting of individual follicles—the "état criblé" of French authors.

3095. The lower part of the ileum with the ileo-cæcal valve and the beginning of the ascending colon from a case of typhoid fever. The chief point of interest in the ileum is the swelling of the agminated glands; this is most marked near the ileo-cæcal valve and for three or four inches above it. The mucous membrane is greatly thickened, and the rugæ are well marked. The solitary follicles are slightly enlarged. Immediately above the valve the gut is ragged from ulceration, and in the ileum are a few small circular ulcers extending into the submucous coat.

In the large intestine the solitary follicles are swollen, and there are small circular ulcers, varying in size up to that of a lentil, affecting the mucous membrane over these swollen follicles. Some of the larger ulcers show small adherent sloughs. The margins of the ileo-cæcal valve are thickened. 5524

History.—Eliza Ireland, aged 24, was admitted to the Hospital on October 12th, 1880, having been suffering from typhoid for ten days. Death occurred on the 29th day. Just before death the temperature fell to 95°-96°, having previously been high. There was continued vomiting with dysenteric diarrhœa.

At the *post-mortem examination* there was hypostatic pneumonia, and two small ulcerated patches in the stomach. There was extensive ulceration of the small intestine, but none of the ulcers had gone deeper than the muscular coat. Ulceration had also extended for some distance along the ascending colon. The mesenteric glands were much swollen, especially near the lower end of the ileum. (*Vide* Dr. Ringer's *Case-book*, Females, 1880, p. 464.)

3096. A piece of ileum from a case of typhoid. In the centre is a large ulcer of somewhat irregular outline, but approximately oval, the long axis corresponding with that of the gut. Immediately below this, and separated from it by a bridle of mucous membrane, is a minute transverse ulcer; still lower is another larger one, and near the lower end is a fourth very small ulcer. All the ulcers lie along the free border of the gut; their edges are sharp and slightly overhanging; the mucous membrane for two or three lines round the ulcers is slightly thickened and puckered. The floor of each ulcer is quite clean, and in the larger one the transverse muscular layer can be seen, giving it a somewhat lined appearance. The bases and edges of the ulcers are not thickened, nor can any nodular bodies be seen in any of them. The peritoneal coat is everywhere quite smooth. The sharply defined margins and the smoothness of the bases of the ulcers show that the sloughs have been cast off, but the depth and sharp edges tend to prove that the process of granulation has not advanced far. The condition present would correspond with about the early part of the fourth week of the disease. 4829

3097. A portion of the lower part of the ileum from a case of typhoid. The mucous membrane presents a number of ulcers set in linear series along the free border of the intestine—in shape the ulcers are approximately oval, in size they vary considerably. The ovals of the smaller ulcers are transverse to the long axis of the gut, but of the large ones are longitudinal. The borders of the ulcers are not infiltrated, the edges are clean cut, and, in parts, distinctly overhanging; the floor is clean, and in most cases is marked by transverse lines, the exposed transverse muscular fibres. No granular bodies can be seen in the ulcers. On holding the specimen against the light, spots of thinning will be seen in many of the ulcers, and in the lower one there is a minute oval perforation. The peritoneal coat is slightly roughened in patches from the presence of adherent lymph; this is most evident in the neighbourhood of the perforation.

The specimen is without history, but there can be no doubt it is from a case of typhoid, and corresponds to about the fourth week. Death ensued on the perforation setting up general peritonitis. 3670

3098. A portion of the colon, principally the transverse segment, from a patient who died of typhoid fever. The mucous membrane is extensively ulcerated, the ulcers varying greatly in size and shape, the larger ones covering extensive sinuous tracts. By holding the specimen against the light it will be seen that the depth of the ulcers differs, some are quite superficial, while the floor of others is formed by peritoneum only. There is no perforation. The edges of the ulcers are rather ragged and undermined. The peritoneal surface is for the most part normal, but opposite the larger tracts of ulceration a few shreds of adherent lymph can be seen, and in places binds down the appendices epiploicæ. 6006

History.—George Strickland, aged 25, was admitted into University College Hospital under Dr. Wilson Fox, in February 1884. Death occurred on the 38th day of the disease, hæmorrhage having been almost constant since the 17th day.

At the *post-mortem* examination the omentum was found to be adherent to the brim of the pelvis, but there was no general peritonitis. The colon was adherent to the omentum or abdominal wall at four points, and was perforated at those situations; but extravasation had been prevented by local peritonitis. Blood-clots were found in the colon. The ulceration extended throughout the whole of the great intestine, from cæcum to rectum, but there was none in the small intestine, with the exception of slight ulceration in a Peyer's patch close to the end of the ileum. In the notes of the case it is stated that in some parts the ulceration was of a dysenteric nature. In some cases neither during life nor after death can it be asserted that the morbid process had altogether dysenteric or altogether typhoid characteristics; a very prolonged and severe typhoid *may* give clinical and pathological signs indistinguishable from dysentery.

3099. A piece of small intestine, from a case of typhoid fever. At the lower end of the specimen, close to the mesenteric border, is a sacculus which has been perforated in two places. At the upper end of the specimen is a third perforation in the floor of a small ulcer. The peritoneum, especially round the upper perforation, is coated with flakes of adherent lymph. 6233

TUBERCULAR ULCERATION OF THE INTESTINES.

Tubercular ulcers of the intestine are extremely rarely met with as a primary lesion, but are usually seen in cases of advanced pulmonary phthisis. They are more common in children than in adult life. The disease especially attacks the lower end of the ileum and neighbourhood of the ileo-cæcal valve, in some cases extending for some distance along the colon (No. 3102), and even reaching to the anus; more rarely the ulcers are met with higher up, and may extend to the jejunum.

The main stress of the disease falls upon the lymphoid follicles and plaques; these become infiltrated with numerous round cells, forming a slight nodular prominence covered with epithelium. Caseation soon occurs: the epithelium is necrosed, and a minute ulcer results. This gradually increases in size, partly by coalescence with neighbouring ulcers (No. 3103), and partly from a fresh deposit of tubercle in its edges, which ultimately caseates. By this process the ulcers may attain considerable size. They run transversely to the longitudinal axis of, and may encircle, the gut (No. 3100), but are sometimes parallel with it. The outline of the ulcers is very irregular, the edges are usually indurated and nodular (No. 3104), and the base often studded with nodules (No. 3101). The depth to which the ulceration extends depends upon its duration, most frequently it attacks only the mucous and submucous coats, and consequently extensive hæmorrhage and perforation are rare. Should the muscular coat become involved the process extends very gradually. The peritoneum over the base of the ulcers is reddened and opaque, and miliary tubercles are seen underneath it, often grouped round the blood-vessels (Nos. 3101, 3104).

Ulceration spreading through the gut lights up peritonitis, and this process leads to a gluing together of adjacent coils of intestine; this adhesion may be perforated by the tubercular process so that bowel may open into bowel by altogether abnormal apertures. The peritoneal surface is very apt to show tubercular nodules about the base of the ulcer, and spreading away from it in decreasing numbers (Nos. 3100, 3101).

Complete cicatrization of tubercular ulcers is rare (Nos. 3106, 3107), more usually they gradually extend in number and area until the death of the patient, either from the intestinal lesion or more rapidly progressing tubercle in other organs. Cicatrization may lead to obstruction, as in No. 3105.

The mesenteric glands become affected with tubercle and undergo caseation, hence absorption from the alimentary tract is seriously impaired, leading to serious loss of nutrition (No. 3105).

If a contrast be made between typhoid, tubercular, and dysenteric ulcerations, some such conclusions as these may be drawn:—typhoid is much more neat and cleanly in its destructive tendencies, and limits its attention to the lymphoid follicles and Peyer's patches, respectful of the neighbouring tissues; it has a greater tendency to open into vessels and into the peritoneum, but cicatrizes more neatly and without causing stenosis. Tubercular ulcers are less respectful of other tissues than typhoid, they spread beyond the limits of the lymphoid islands and patches. Dysenteric ulcers are the third and worst degree in this regard: they respect no tissues and know no bounds; they are disorderly, disreputable, and destructive; therefore any ulceration which is both wide and deep, and not limited in any distinct manner to the lymphoid structures, is almost certainly dysenteric.

3100. A loop of the small intestine with its attached mesentery. The peritoneal surface of the gut is thickly studded with small tubercular nodules. Along the free border these are so closely set that they form a continuous tract of infiltration, but towards the attached border, and in the mesentery itself, the nodules are much more sparsely distributed. A layer of lymph covers the peritoneal surface, where the massing is densest. The mucous membrane shows patches of ulceration; the ulcers are small, but are here and there distinctly transverse in direction. 692

History.—The specimen was from a child, who died of chronic hydrocephalus and general dropsy. The whole length of the alimentary canal was studded with similar white tubercles. The mesenteric glands were caseous, but not much enlarged.

3101. A portion of the small intestine, probably the lower part of the ileum, showing tubercular ulceration of the mucous membrane. The ulcers are ranged in linear series along the free border of the gut; they are more or less circular or oval in outline; when the latter the long axis of the oval is placed transversely to that of the gut. The borders of the ulcers are raised, and the edges craggy and undermined, the floor uneven and shreddy. In the deepest parts of the ulcers the wall is thinned, as is shown by fine transparent lines. The presence of small opaque granular bodies (miliary tubercles) in the base of the ulcers is very distinct; they look like minute grains of unboiled sago, just beneath the peritoneum, which is raised over them. The peritoneal surface is unaltered, except over one of the ulcers, where there is a shred of lymph. The ulceration is not unlike that of typhoid fever, for the transverse direction is not marked, and the process is limited to Peyer's patches. The presence of the miliary tubercles beneath the peritoneum is, however, diagnostic. 5042

History.—Mary A. Cartwright, admitted Feb. 2nd, 1864, under Sir William Jenner. She died of tubercular phthisis. No mention is made of symptoms referable to the state of the bowels. At the *post-mortem*, besides the pulmonary and laryngeal affection, it was found that the ulceration of the intestines affected the whole small gut and extended into the colon. The mesenteric glands were enlarged and caseous. (*Vide* Sir William Jenner's *Case-books*, Females, 1863–1864, p. 228.)

3102. Tubercular ulceration of the large intestine. The mucous surface shows numerous shallow ulcers, of variable size and form, and very irregular in their distribution, but tending to take a transverse direction. The edges are well-defined, and the borders slightly raised. The floor of the ulcers is very irregular, the surface presenting a minutely pitted and worm-eaten appearance. Viewed against the light most of the ulcerated patches, even in their centres, appear somewhat darker than the surrounding parts, indicating some infiltration of their bases; in a few instances there is slight thinning. The peritoneal coat is for the most part smooth. 5316

History.—C. W. Nash, aged 17, was admitted under Dr. Wilson Fox, in March 1868. He had been ill for the previous three months, suffering from abdominal pains, with diarrhœa, occasional vomiting, and anorexia. Both lungs were affected at their apices. Two years before he had a cough which had continued.

Post-mortem Examination.—The larynx was deeply ulcerated; there were small tubercles scattered through the mucous membrane of the trachea. Lungs riddled with cavities. Numerous scattered miliary tubercles in the spleen and a few in the liver; none in the kidneys. There was considerable ulceration of the cæcum and colon. (*Vide* Dr. Fox's *Case-book*, Males, 1868, p. 403.)

3103. A portion of the jejunum, showing extensive tubercular ulceration. The ulceration is in large irregular tracts, and in some places forms small circular or oval patches, and it is by the confluence of these that the larger tracts have arisen. The tendency of the disease is to extend across the long axis of the gut; this is especially well seen in the larger ulcers. The smaller patches present a punched-out appearance, with sharp undermined edges; the larger ones show similar sharp overhanging edges and an uneven pitted floor. The process does not appear to have spread farther than the submucous coat. The edges are not markedly infiltrated. At one or two spots the peritoneum is dotted with miliary tubercles, but elsewhere it is smooth. 693

History.—The patient was in University College Hospital for scrofulous disease of the ankle-joint, and died after being attacked with obstinate diarrhœa. Almost the whole of the intestine was similarly affected.

3104. A piece of the lower part of the ileum, showing tubercular ulceration. The ulcers are scattered over the surface of the mucous membrane, and their long axis is transverse to the long axis of the gut. Their shape is irregular, both base and edges are infiltrated; the thickening of the latter is very evident to the eye, but the infiltration of the base can only be seen by holding the specimen against the light, when each ulcer appears as a black patch. The floor is irregular, but not shreddy. Near one end of the specimen is a Peyer's patch, and it is noticeable that the ulceration, although in close proximity to the patch, has not selected it. The peritoneal surface over the situation of most of the ulcers is roughened by lymph deposited on it.

On close inspection of the peritoneum, minute opaque granular bodies can be seen; these are miliary tubercles. 5392

3105. A piece of large intestine from a case of intestinal obstruction due to cicatrization of tubercular ulcers. The specimen may be conveniently described as consisting of three parts.

The upper part is that above the obstruction, and shows the gut much dilated; the mucous membrane is smooth, without folds or rugæ, and a few sharply cut circular ulcers can be seen; the walls are thickened.

The mid portion, about four inches in length, is the seat of constriction; here, with the exception of a few hypertrophied pendulous folds of mucous membrane, the surface has been completely destroyed by ulceration. Just below the hypertrophied folds, the surface is extensively undermined, but the wall is still entire. A piece of white glass indicates this part. Along the upper sinuous margin of the ulcer, the erosion has extended as far as the peritoneal coat. In connection with this middle portion is a large grape-like cluster of lymphatic glands, one of which in particular is much enlarged and has been laid open. The cut surface shows that the gland is undergoing peripheral caseation; one half has been shelled out of its capsule to show the yellow nodules on its surfaces.

The lower portion of gut shows a normal calibre, and tolerably healthy mucous membrane. The openings of the follicles can be seen.

The specimen is from a little girl æt. 6½, who died from intestinal obstruction.

3106. A piece of the ileum which has been the seat of tubercular ulceration, which has become cured. At three spots the presence of transverse puckering marks the site of ulcers which have undergone nearly complete cicatrization. The uppermost ulcer shows the greatest degree of puckering, and at this level there is some narrowing of the gut. There is considerable infiltration at all three spots, as may be seen by the amount of opacity of the wall. The peritoneal surface over these cicatrices is smooth, with the exception of a few fibrinous shreds over the upper one, indicating a slight local peritonitis.

The puckering has a stellate appearance, and this circumstance suggests a syphilitic source. 5393

3107. Four pieces of the small intestine from a patient who died of cholera. The specimens show tubercular ulceration in various degrees of cicatrization. The ulceration is most marked in the upper two portions; in the lower a slight transverse puckering of the mucous membrane is the chief feature. The process has apparently principally attacked the agminated glands. If the specimen is held up against the light, minute opaque granular bodies can be seen. These are miliary tubercles; they are most numerous in the upper two segments, where they are also seen on the peritoneal coat. There is inflammatory thickening round some of the ulcers, especially the highest ones. The walls of the gut are very thin and smooth except in the situation of the ulcers. This thinning is due to atrophy, principally affecting the muscular layer.

There are no changes due to cholera. (*Vide* Path. Trans. 1867. Dr. Wilson Fox.) 5254

For Wax Models of Tubercular Disease of the Intestines, see page 142, *Nos.* 3584 *to* 3588.

CHOLERA.

The pathological appearances met with in Asiatic cholera vary considerably in different epidemics, and according to the stage at which death occurs.

The most frequent change is noticed in the lymphoid glands of the small intestine; sometimes this change is preceded by disease of Brunner's glands. The glands become swollen, and project from the surface of the mucosa (No. 3108). After about forty-eight hours this swelling tends to subside, the follicle still remaining, however, somewhat enlarged and wrinkled. In some cases Peyer's patches and other parts may ulcerate as in typhoid fever (No. 3109), and the ulcers may be covered with a false membrane as in diphtheria (No. 3110).

The infiltration and swelling may also affect the mucous membrane between the glands.

The mesenteric glands become swollen and infiltrated. The disease may spread to the colon. The vessels of the mucous membrane may be anæmic or intensely congested, and accompanied by petechial extravasations. The upper part of the alimentary tract is usually unaffected, but there may be some swelling of the œsophageal glands. The spleen is usually small. The kidneys are early affected, becoming much congested, and the epithelium proliferating and degenerating, the kidney-substance increases in bulk, and becomes decolourized. In women it is not uncommon to find a kind of diphtheritic ulceration of the interior of the uterus and of the vagina (No. 3111).

Owing to the large quantity of water lost by the evacuations of cholera, post-mortem changes are much delayed, and for the same reason the serous surfaces are sticky or dry. Rigor mortis is usually well marked.

3108. The pyloric end of the stomach with the first part of the duodenum from a case of cholera.

The portion of stomach does not show any obvious pathological changes. The solitary glands of the duodenum are much enlarged, projecting from the surface, and being mostly club-shaped. The peritoneal coat is normal. 5253

History.—The patient was admitted to the Hospital during the Cholera Epidemic of 1866, on Oct. 1st. At 10.30 A.M. on Sept. 28th, diarrhœa had set in, which increased in severity until his admission. There had been occasional vomiting since Sept. 29th; abdominal pain set in on Oct. 1st. Death occurred in the algide stage.

Post-mortem Examination.—There was slight catarrh of the mucous membrane of the stomach. The solitary glands in the small and large intestines were enlarged and injected; this was especially noticeable in the duodenum and cæcum. There was general congestion of the mucous membrane. Peyer's patches were swollen and injected. Near the ileo-cæcal valve there were two or three patches in the ileum covered with fibrinous exudation. Spleen pale and flabby. Petechiæ on the pericardium and pleuræ. (*Vide* Cholera *Case-books*, p. 187.)

3109. A piece of the large intestine from a case of cholera. Near the centre of the specimen is a large oval ulcer, its greatest length is transverse to the long axis of the gut. It is surrounded by a number of small, almost linear ulcerations, looking like small rents and having a transverse direction.

Near the upper end close to one border is a large irregular ulcer, with much dark brown discoloration of the mucous membrane around it. Similar staining, but less intense and more limited, is noted round the other ulcers. The erosion is quite superficial, and the peritoneal surface apparently unaltered.

These ulcers are no doubt examples of hæmorrhagic erosion, *i. e.* extravasation of blood into the mucous membrane leading to necrosis of it. 5256

3110. A portion of the ascending colon from a man who died of cholera. Along the middle line in the axis of the gut patches of superficial necrosis are seen, the necrosed parts being still adherent. These patches extend about halfway down and at the lower end tail off in an oblique direction. About one inch from the lower end two smaller patches are present. The adherent sloughs are of a buff colour, and sharply though irregularly outlined; surrounding them is a narrow whitish zone of superficial ulceration. About the middle of the gut the mucous surface is whitish and uneven, incomplete separation of the sloughs having occurred. The above changes present some likeness to the diphtheritic process, and have been described as such. This appears to be not infrequent in the large intestine in some epidemics, whilst in others it is almost entirely absent. 5255

History.—W. Carter, aged 46, was admitted into University College Hospital on Sept. 10th, 1866. On Sept. 7th he had eaten some putrid meat; on the 8th, at 10 P.M., he felt ill, and in four hours diarrhœa, vomiting, and cramps set in, accompanied by suppression of urine. The evacuations were described as rice-water before admission, after which the material was of a brown or chocolate colour, becoming tarry on the 11th. The temperature was subnormal. Death occurred at 6.45 A.M. on Sept. 12th.

Post-mortem Examination.—The mucous membrane of the stomach was injected, opaque, swollen, and softened. Brunner's glands in the duodenum were somewhat enlarged. The lower third of the ileum was much congested, the valvulæ conniventes over considerable areas were black with blood. The solitary glands were enlarged, but Peyer's patches unaltered. The intestines contained a tarry fluid of fœtid odour. Spleen small; weight 2 ozs.; the tissue was firm. Lungs congested. (*Vide* Cholera *Case-books*, Dr. Wilson Fox, 1866.)

3111. A uterus with its appendages, the body and cervix having been laid open from behind. The mucous membrane of the fundus uteri is ragged in appearance, seeming almost in a sloughy condition; it is described in the MS. Catalogue as having been intensely congested. The ovaries have been cut into, and numerous Graafian follicles are seen. 5257

The patient died of cholera in 1866. In the account of the specimen in the MS. Catalogue it says:—"This condition (congestion and softening of the mucous membrane) was very frequently noticed during the cholera epidemic, and was at first supposed to be merely chance menstruation; but it was occasionally seen in children of very tender age, and in girls before the age of puberty; it is therefore probable that the congestion resulted from the disease."

Cancer of the Intestines.

The intestines may be the seat of a primary cancerous growth, or may be secondarily affected.

Primary cancer is most commonly seen in some part of the large intestine, more especially at one of the flexures or in the rectum. (Consult Surgical Catalogue, Part I. p. 213.)

Columnar epithelioma is the most usual variety (No. 3114), but scirrhus and colloid are often met with. The disease is very similar in its leading characteristics to cancer of the pylorus. It tends to invade the whole calibre of the gut, forming an annular constriction which materially diminishes the lumen (No. 3114); by temporary congestion complete closure may result, leading to acute intestinal obstruction. Obstruction which has been more or less complete for some time may be rendered less so by ulceration and sloughing of the surface of the growth, or, in rarer cases, owing to the formation of a fistulous communication between the coil above the growth and a coil below it (No. 3113). As in cancer of the stomach adhesions may form to neighbouring parts, and many coils of gut become fused together. In some instances fistulous openings may form between the bladder or uterus. (*Vide* Obstetric Catalogue.)

Secondary deposits occur in the glands and other parts, as in cancer elsewhere. No. 3115 is a specimen of polypoid projections of the mucous membrane.

3112. Two portions of the ileum showing nodules of new growth situated under the peritoneum at the mesenteric border of the gut. The mucous membrane is not implicated, and can be moved freely over the larger nodules, but to a less extent over the smaller ones. The muscular coat is apparently implicated. The nodules are of firm consistence. 5472

History.—W. A., aged 64, complained of illness for six weeks before admission in January, 1880. He was emaciated and anæmic, and complained of pain along the spine and round the umbilicus. In the umbilical region a painful tumour could be felt, and also smaller nodules in the lower part of the abdomen. There was obstinate constipation, giving way to purgatives, after which diarrhœa set in. He became drowsy and semi-comatose, and died seven days after admission.

Post-mortem Examination.—A mass of new growth was found involving the pyloric end of the stomach, and projecting into the interior of the organ. Secondary nodules were found in the liver, mesenteric glands, on the diaphragm, and both layers of the pleura, the kidneys, and in the lower part of the ileum and upper part of the colon. Microscopic examination proved the growth to be a glandular carcinoma.—*Vide* Dr. Ringer's *Case-books* (Males), Jan. 1880, p. 44.

3113. A piece of the transverse colon, adherent to the posterior surface of which is a piece of the ileum, about five feet from the ileo-cæcal valve. The pieces are united by a dense mass of new growth and peritoneal adhesions. The growth is more extensive in the colon, which is narrowed by it. The ulcer in the ileum is about one inch in diameter, and in its centre is a fistulous opening between the two portions of gut. The calibre of the ileum was narrowed. The ulcerated cavity contained yellowish fæcal matter and numerous grape-pips. 6419

History.—Frances Tollivey, 64, was admitted into the Hospital under the care of Mr. Beck on Oct. 17th, 1888. She had been ailing since 1885, and gradually getting worse. The chief symptoms were pain and abdominal distension, occasional vomiting, and gradually increasing constipation. Latterly, the difficulty in passing anything along the gut had been very great, and the vomiting had been persistent and severe. On admission, there was great abdominal distension, general tympanites, with slight tenderness. No tumour could be felt. Rectal examination nil. Death took place on Oct. 30th, from septic pneumonia and pleurisy.—*Vide* Mr. Beck's *Case-books*, 1888. Pathological Society's Trans. 1889.

3114. A piece of the ileum, with the cæcum and part of the ascending colon, in which is a colotomy wound. The ileum is greatly dilated. The cæcum is the seat of a large mass of columnar epithelioma. A piece of glass has been passed along the lumen, which is much narrowed. 6418

History.—Keziah A. Williams, 50, was admitted into the Hospital, under Mr. Beck, on Oct. 31st, 1888. In May she complained of griping pain after food, felt chiefly at the umbilicus; this gradually increased, and the patient failed in health and lost flesh. On Oct. 15th there was vomiting and tympanites. On admission, the abdomen was uniformly distended, tense, and tympanitic. There was no dull area, but on deep pressure in the right iliac fossa, hard nodules could be felt. Rectal and vaginal examination nil. There was dysuria. On Nov. 10th, as the patient had had complete obstruction for some days, Mr. Beck performed colotomy in the right loin. Nothing escaped on opening the gut, but on passing the finger along it in the direction of the ileo-cæcal valve, the mass of cancer could be felt and the lumen made out. Through this a full-sized piece of soft rubber tubing was passed, in the hope that fæces would pass along it. On Nov. 11th flatus was passed through the tube, but no fæces. Nov. 12th: an exploratory incision was made in the right iliac region, and the ileum was stitched up to the skin and peritoneum and opened. Nov. 13th: the bowels were opened at 4.30 P.M., but the patient died at 7 P.M.—*Vide* Mr. Beck's *Case-books*, 1888. Pathological Society's Trans. 1889.

3115. A piece of the small intestine, with polypoid outgrowths of the mucous membrane. The walls of the gut are thickened. Two small pendulous bodies are seen projecting from the mucous surface; the membrane covering them is apparently healthy. 526

3116. A piece of the ileum laid open, showing a peculiar form of intestinal obstruction, which was situate about one inch above the ileo-cæcal valve. The obstruction is caused by the projection into the lumen of the gut of a smooth rounded mass which is seen in section.

It consists of the much thickened coats of the intestine, which at this spot have been invaginated, looking very much like a cross section of the pylorus, differing from it, however, in the fact that all the coats, including the peritoneal, are involved in the projecting mass, and, furthermore, that the invagination is not involving the entire circumference of the gut, but is limited to one part only. The opposed surfaces of peritoneum, seen as a line in the centre of the nodule, have become adherent, so that the condition is permanent. Externally a transverse groove marks the site of the invagination. The cut surface of the nodule is firm in consistence. Before the gut had been laid open, the nodule projecting into the interior had produced great obstruction, but there was still a passage large enough to admit a cedar pencil.

Above the obstruction the gut is much dilated, and the valvulæ conniventes are smoothed out; below the calibre is normal. The peritoneal coat both above and below the obstruction is covered with recent lymph; that above appears to be of older date, as it forms a uniform layer more firmly adherent; below the obstruction it can be peeled off in large flakes, leaving a smooth surface.

The mesentery, which is much thickened, crumpled, and contracted, is invaded by new tissue of fibro-cartilaginous density, enclosing two softer masses, probably lymphatic glands. 5550

History.—Mr. T., aged 50, was quite well till May 1880. He then suffered from vomiting and diarrhœa, with epigastric pain; the symptoms increased, and he became very weak, and had lost five or six stone in weight by January 1881. No history of hæmatemesis or melæna. On January 27th he went into Fitzroy House under Dr. Poore. Then the abdomen was found much distended, there was no localized tenderness, but general uneasiness during palpation. Weakness very marked, especially in the lower limbs, but the strength of the arms was normal. He stated that all his trouble was "below the umbilicus." There was no alteration in sensation, or in the reflexes of the lower limbs. Nothing abnormal about the spine. Temp. 98°·8; pulse 120, feeble. On the 28th and 29th, there was some diarrhœa. On the 30th he had a rigor accompanied by restlessness, vomiting, and increased abdominal distension. On Feb. 2nd there was peritonitis. There was dyspnœa, owing to the abdominal distension; the patient was quite rational. He died quite suddenly.

Post-mortem Examination (Feb. 3rd).—In the ileum, about one foot above the ileo-cæcal valve, was found a thickening of the gut caused by an involution of its coats, which were retained *in situ* by inflammatory thickening. The canal of the gut was narrowed, but would admit a big cedar pencil. The neighbouring piece of mesentery with its glands formed a dense cicatricial mass. The spinal cord was not examined. There was no history of injury, nor was there any evidence of an acute onset of the trouble.

HÆMORRHAGE INTO THE WALLS OF THE INTESTINE.

3120. A piece of small intestine laid open. At one part the mucous membrane is bulged forwards by a hæmorrhage which has occurred beneath it. The gut is otherwise unaltered in appearance. 6464

History.—The specimen was removed from a child, æt. 8, who died from the effects of perforation of the vermiform appendix. The child was operated on by Mr. Barker in March 1889.

FOREIGN MATTERS PASSED PER RECTUM. (*Vide* Surgical Catalogue, Part I. p. 206.)

SERIES XLI.—DISEASES OF THE LIVER.

FATTY DEGENERATION.

Under normal conditions the liver contains a small quantity of fat, from three to four per cent., and this may be increased temporarily without constituting a diseased condition. Fatty metamorphosis of the liver-cells may be dependent upon prolonged suppuration, chronic febrile states, syphilis, cancer, tubercle, and phosphorus poisoning, and also upon continued overfeeding and the abuse of alcohol and beer. It is almost constantly met with in pulmonary phthisis.

The fatty condition may be only slight, or far advanced, so that the organ is composed almost entirely of fat.

The liver is uniformly enlarged, sometimes enormously, smooth on the surface, and the capsule is rendered tense but still retains its polish. The edge of the liver is swollen and distinctly rounded (No. 3125). The colour is usually yellowish red; the consistence is diminished, and the organ may be so light as to float in water. On the organ being cut the knife becomes greasy. The blood-vessels contain less blood than usual, except in the case of the so-called nutmeg-liver.

The fat-globules are deposited in the liver-cells, never in the interstitial substance; they may only partially fill the cell or may flatten out the nucleus and cause the cell to assume a globular shape. According to some the nucleus itself becomes destroyed after a certain stage of the process has been reached.

Nutmeg-liver is the name given to a liver which shows fatty degeneration associated with congestion (No. 3127). It is quite commonly met with in cases of obstructive heart-disease. In this condition the centres of the lobules are of a dark colour partly from congestion of the hepatic capillaries, and partly from staining by bile-pigment, which is most abundant in the cells forming the centre of the lobule. The cells forming the periphery of the lobules are very pale and in a condition of fatty degeneration, and in addition to this the pallor is deepened by anæmia of the portal capillaries.

3125. The right lobe of a liver which is in a condition of fatty degeneration. The whole organ weighed 3½ pounds. The lobe is much increased in size, and its margins are characteristically rounded. Two deep grooves produced by the ribs are seen at the upper part of the specimen. The cut surface is pale and studded with congested vessels. 6520

ALBUMINOID DEGENERATION.

Waxy or Lardaceous degeneration very commonly occurs in the liver, spleen, and kidneys of those who have for a lon time been the subjects of suppuration (No. 3126). Thus it is especially common in cases of chronic phthisis and other tubercular affections, in old-standing bone and joint mischief, and in syphilis. It is frequently associated with fatty degeneration, the causes of the two conditions being similar. The chemical nature of the waxy material is not known, owing to the difficulty of separating it from the tissues in which it is deposited and so obtaining it pure. Dr. Dickinson considers that the tissues become dealkalized on account of the large amount of alkali contained in pus, and that the waxy material is dealkalized fibrine. But in some cases it occurs, as in syphilis, independently of suppuration,

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and moreover this theory does not account for the fact that the degeneration is limited to certain viscera.

The disease always begins in the small arteries and spreads to the capillaries. The larger vessels are never affected. The vessel becomes swollen, the waxy material being deposited in the middle and inner coats, and on account of its high refractive power gives the vessel a shining lustrous appearance. The process extends to the proper cellular elements of the organ, affecting first that part of the lobule in the closest proximity to the branch of the hepatic artery. The affected portions become firmer in consistence and of a yellowish-red colour, the lobules themselves are strictly marked out. The granular contents and nucleus of the cells disappear, and in advanced cases the cell-wall itself is ruptured and the waxy masses from adjacent cells fuse together.

Lardaceous disease usually affects the liver pretty uniformly, but sometimes is found to be limited to, or more abundant in, certain areas.

The liver may be enormously enlarged and increased in weight and consistency, but still retains its normal shape. Its surface is smooth, the capsule tense and shining, the edge is rounded if the condition is associated with fatty change, otherwise it is sharp.

If there is any associated disease of the organ, *e. g.* cancer, these appearances will necessarily be modified. The section of the organ is dry, smooth, firm and lustrous, and has been likened to a thin slice of smoked salmon; thin slices are translucent.

If a solution of iodine is applied to the surface the waxy material is stained a deep brown colour, and in some cases if sulphuric acid is added, this changes to a dirty violet or blue colour; the unchanged liver-tissue is not stained.

3126. A slice of an albuminoid liver. The section is quite smooth and of a somewhat translucent waxy appearance. It is hard and resistant. The colour is not uniform, some parts, especially round the vessels, being much paler in colour than others; these areas are the seat of fibroid overgrowth.

History.—The specimen was from a youth who had suffered for a long time from suppurative hip-joint disease.

The Effects of Mechanical Congestion of the Liver.

Any impediment to the onward flow of blood in the hepatic veins will lead to important results. The first effect of the obstruction will necessarily be dilatation and congestion of the vessels and their capillaries. Such a liver, if cut, would show a mottled condition of the surface of section, the central vessel of the lobule being much congested, while the peripheral capillaries would be anæmic, and hence this area pale (No. 3127). Such changes cannot be well seen in museum specimens which have been long immersed in spirit and discoloured.

When the congestion has become chronic these appearances become more marked than ever, a section of the organ having a characteristic mottled appearance, gaining for it the name of nutmeg-liver (No. 3127) (*vide* Fatty Degeneration of the Liver, page 34). The liver-cells undergo fatty degeneration.

In more advanced cases still, atrophy of the secreting substance with thickening of the capsule occurs (No. 3128). The shrunken liver is very vascular, the capillaries being much dilated. The organ is often irregular in shape from unequal shrinking of its substance.

Hæmorrhage into the hepatic substance as the result of simple congestion is rare.

3127. Two slices of liver showing the effects of mechanical congestion. The appearances are less marked than in the recent state owing to the loss of colour from immersion in spirit. The vessels appear as dark-coloured spots surrounded by pale liver-substance in a state of early fatty degeneration; this is especially well seen on the peritoneal surface, which has the characteristic nutmeg appearance. The mouths of the larger vessels seen in section contain blood-clot. 6463

History.—The specimen was taken from a woman about 45 years of age, under the care of Dr. Bastian, in March 1889. She was supposed to be the subject of a mediastinal tumour, but at the post-mortem examination none was found, but the tissues in the superior mediastinum were much thickened by chronic inflammation. She was the subject of valvular disease of the heart. Both internal jugular and subclavian veins were obstructed by thrombosis. This began to show itself about a year before death. At the p.m. these vessels were found obstructed by organized blood-clot, on the left side the veins were filled by it. The clotting extended into the superior vena cava. Many of the effects of this obstruction passed off some months before the patient died.

3128. Two slices from the liver of a man who died of mitral disease. The capsule is thickened and extends inwards into the liver-substance as firm bands of fibrous tissue. At one part close to a large vessel is a mass of white cicatricial tissue in which the open mouths of blood-vessels can be seen. The lobules of the liver are separated from one another by fine bands of connective tissue. The mouths of the vessels stand widely open, and the smaller ones are dilated and plainly visible. 5580

History.—Henry Maunders, æt. 32, was admitted under the care of Dr. Bastian, Feb. 11th, 1881, suffering from the effects of stenosis and incompetency of the mitral valves. He had had several attacks of bronchitis and dropsy, with palpitation. There is nothing worthy of special note in the clinical history. He gradually became very cyanosed and suffered from orthopnœa. Death occurred March 24th.

Post-mortem Examination.—The pericardium was found to be uniformly adherent, and calcified in patches. The heart was hypertrophied and dilated. Both lungs were consolidated and tougher than natural, being extensively invaded by cicatricial tissue. The liver, considerably depressed, was firmly adherent to surrounding parts. It was much smaller than usual, measuring 8½ inches transversely, 5 inches antero-posteriorly, and ⅝ inch in thickness. The capsule was notably thickened and opaque. On section the capsule of the liver was found, over a considerable part of the anterior surface, to be enormously thickened, growing into the substance of the organ for a depth of about ⅛ inch, while about the middle of the upper surface it grew far into the centre of the liver and was continuous with a cicatricial patch, white and vascular, occupying this situation. This patch, ½ inch in diameter, sent ramifications into the liver-substance in all directions. The liver-substance was throughout much paler than natural. Many of the lobules were arranged in a curious rosette-like manner. In some parts there was considerable hyperæmia. Consistence considerably but unequally increased. The terminations of the hepatic veins were extremely dilated. The spleen was much harder than usual, the kidneys slightly so. (*Vide* Dr. Bastian's *Case-book*, 1881, p. 451.)

CIRRHOSIS OF THE LIVER.

Cirrhosis of the liver is a chronic interstitial hepatitis produced, in the vast majority of cases, by the irritant effects of spirits. It may be due in some cases to the spread of inflammation into the liver-substance from perihepatitis, or be consequent on syphilis. In some cases the condition occurs in those of temperate habits and without any evident cause, possibly as the result of an extension inwards of a chronic inflammation of the peritoneum covering the liver and affecting Glisson's capsule, and it is possible that some people may be especially prone to cirrhotic conditions of the viscera generally.

Cirrhosis may be met with at any stage. It consists essentially of a chronic inflammation of the fibrous stroma or Glisson's capsule, and in many cases there is a pre-cirrhotic stage, during which the organ is increased in size from congestion. The fibrous bands thus become increased in size and density, with a tendency to contract like scar-tissue elsewhere. This contraction causes pressure on and subsequent changes in the proper liver-cells. In advanced cases the following changes may be noted:—

The liver is of a pale grey colour, considerably diminished in size, and presenting bosses and depressions on its surface, and hence often called hob-nailed liver. The depressions correspond with the strands of fibrous tissue; in contracting these isolate and press upon portions of the liver-substance (Nos. 3129 and 3130). The whole organ may be uniformly affected, but usually the left lobe is in a more advanced stage than the right, and the edges suffer first. The shrinking is more noticeable in the superficial diameters of the liver, the thickness being much less altered, consequently the liver becomes more globular in shape.

The increased amount of fibroid tissue necessarily produces extreme toughness of the liver-substance, and the capsule having taken part in the process is thickened and often adherent to the parietal peritoneum, and by its contraction tends materially to compress and alter the shape of the liver.

On section the liver is found to be leathery in consistence (No. 3131), and the nodular appearance of its surface is well seen on the cut surface.

These nodular masses vary a good deal in size up to $\frac{1}{2}$ or $\frac{3}{4}$ inch in diameter; they are dark in colour, occasionally bile-stained and pale yellow, and are sharply outlined by the fibrous tissue round, easily recognized by its greater density and whiteness.

If examined microscopically, it will be seen that the cells in these nodular areas are degenerated and atrophied and often contain fat, the changes being more advanced in those cells at the periphery of the hepatic lobules. In addition the fine portal and hepatic-vein capillaries become pressed upon and ultimately obliterated. The hepatic artery is said to become dilated and to develop new capillaries. The new fibrous tissue formed contains in many cases numerous bile-capillaries; it is also crowded with leucocytes.

3129. A slice from a cirrhotic liver. The liver-substance is pale and the cut surface slightly granular in appearance; bands of fibrous tissue intersect the liver-substance, marking it out into small areas occupied by the liver-cells. 559

3130. A slice of a cirrhotic liver. The surface is for the most part nodular, but quite smooth. On the cut surface the openings of numerous blood-vessels are seen. The liver-substance is split up into numerous small islands separated from one another by bands of fibrous tissue which project somewhat above the level of the section, giving it a honeycombed appearance. 2582

3131. A slice of liver-substance. Growing between the lobules are strands of pale translucent material, probably young connective tissue. The liver-cells do not show any marked naked-eye change. At one part the peritoneal covering is beset by very small villous prolongations. The consistency of the organ is much increased. 5638

Microscopic Examination shows that there is a considerable increase in the connective tissue of the liver, in some parts isolating groups of liver-cells. The fibrous tissue is in greatest amount in the neighbourhood of the portal canals. The liver-cells are granular.

For Wax Models of Cirrhosis see page 143, *Nos.* 3589 *and* 3590.

SUPPURATIVE HEPATITIS.

Suppurative inflammation of the liver occurs in two forms, the Pyæmic and the so-called Tropical.

PYÆMIC ABSCESSES (No. 3133).—Secondary abscesses in the course of any pyæmic process may occur in the liver or elsewhere. They are multiple, and vary in size up to that of an orange, usually being quite small, and situate near the surface rather than deep down. They are produced by the impaction of infective emboli in branches of the portal vein. These emboli act in two ways—first mechanically by obstructing the blood-flow and producing congestion, since although the portal vein is blocked, blood can still reach the affected area by the hepatic arteries or by regurgitation through the hepatic vein; secondly and chiefly, owing to the infective properties of the embolus, inflammation is readily excited in the area already lowered in vitality by the condition of the blood-stream. Occasionally pyæmic abscesses burst into the peritoneal or pleural cavities (No. 3133), but usually the patient dies before this occurs. In other cases the suppurative process extends into the blood-vessels (Suppurative Pyle-phlebitis) and may so reach the right side of the heart. In these cases the liver is often fatty and congested.

Tropical Abscess.—Chronic abscess of the liver is much more common in hot climates than elsewhere. It is attributed by various authors to malaria, intemperance, the continued high temperature, and sudden chills, and to the effects of dysentery. With regard to the latter it has been suggested that the gases from the dysenteric gut are absorbed by the blood and carried to the liver by the portal vein, and there set up acute suppurative inflammation; but there is not sufficient evidence to confirm this view: others, again, have regarded the dysentery as the result of the abscess; and, lastly, others regard the occurrence of the two conditions in the same patient as nothing more than a coincidence.

Abscess may occur also as the result of injury, or from suppuration occurring in a hydatid cyst (No. 3132).

Hepatic abscess usually affects the right lobe, and may tend to grow backwards or forwards. Being chronic the abscess has a dense fibrous wall, which may be quite smooth internally, or may be ragged (No. 3132). The abscess may attain an enormous size, as much as seventeen pints of pus having been evacuated. The surrounding liver-substance undergoes fatty degeneration and absorption from pressure, but the fibrous tissue becomes increased in quantity from chronic inflammation. The pus varies in quality; it is usually quite normal in appearance, but in some cases it is greenish or pinkish in colour, and may be stained by blood or bile, the colouring-matters of which become altered. In very rare cases these abscesses may undergo caseation. More usually they burst or kill the patient by exhaustion. Should the abscess burst, the pus may be discharged externally, adhesions having formed between the cavity and abdominal walls, or it may burst through the diaphragm into the pleural sac or lung, and the matter be partly expectorated (No. 3133); in such cases its hepatic origin may often be suspected by the nature of the pus. In other cases the pus may find its way into the pericardium, pleura, peritoneal cavity, stomach, colon, or duodenum, or lastly into the hepatic vein. The result will depend largely upon the situation into which the pus is discharged.

3132. A portion of the left lobe of the liver showing an abscess-cavity occupying its substance. A piece of the wall of the abscess has been removed. The cavity is lined by a layer of granulation-tissue, the wall is about ·5 cm. in thickness and is composed of dense fibrous tissue; the peritoneal covering is normal. On the posterior aspect at the free margin are five other cavities varying in size, the smallest not exceeding that of a small pea. The liver-substance is healthy. Microscopic examination of the contents of the smaller cysts failed to demonstrate the existence of booklets; but it is probable that the specimen is one of suppurating hydatid. The multiplicity of the cavities is against tropical abscess, and the size of the largest against pyæmic. 2135

3133. A portion of the right lobe of the liver with the right half of the right lung and the remains of the diaphragm. The cut surface of the liver presents two large foci of disease. The upper one is rounded, spongy, and reticulate, resembling very closely a mass of soft cancer. The lower and larger area has much the same general appearance, but is broken down in the centre; it formed half of an abscess-cavity containing four or five ounces of dirty pale pus. This cavity appeared at the post-mortem to have been formed by the fusion of two centres of suppuration.

Another smaller cavity is seen in section on the surface of the liver. The surface of the liver, except quite at its anterior margin, is roughened and reticulate in appearance. Where the peritoneum still covers it, the membrane is much thickened. The diaphragm is almost unrecognizable, having been destroyed in the progress of the disease. The base of the right lung is hollowed out so as to form a large abscess-cavity, communicating with the upper surface of the liver. The pleura is thickened and adherent to the lung, and the latter to the remains of the diaphragm. The abscess-cavity is four inches in diameter and extends upwards to the lower margin of the upper lobe of the lung. The apex of the lung is pale and emphysematous, but there are no evidences of tubercle. The lower lobe is very dense and extensively consolidated from chronic inflammation round the abscess-cavity. 6492

History.—The specimen is from the same case as No. 3086: which consult for full account of the history. The left lung was found to be very emphysematous. The upper lobe of the right lung was very adherent to the chest-wall. The liver was much heavier than natural, elongated from above down and irregular in shape. In addition to the disease shown in the specimen, numerous other small spongy masses were seen. All these masses exuded a dirty-looking purulent material when cut across. None of the pus contained any of the yellowish specks met with in actinomycosis.

The kidneys, spleen, and heart were not appreciably altered.

Microscopic examination of the nodules in the liver shows areas of inflammation with destruction of tissue, but repeated stainings failed to show actinomyces, although at the post-mortem it was thought the case might be one of actinomycosis.

It would appear, however, to be a case of chronic pyæmia with suppurating patches in the liver, as the result of the dysenteric condition of the intestines. The abscess seen in section on the surface of the liver burst through the diaphragm and burrowed into the adherent lower lobe of the lung.

For Wax Models of Abscess of the Liver see page 143, *Nos.* 3591 *to* 3593.

Syphilitic Hepatitis.

Syphilitic inflammation of the liver may be diffuse or circumscribed. In the former case the changes are similar to those in simple cirrhosis. In the circumscribed form gummata are found in the substance of the organ and sometimes projecting on the surface, making its outline irregular (No. 3134). These changes are, in well-marked cases, associated with waxy degeneration and peri-hepatitis (No. 3135). In addition to the presence of gummata, the fibrous tissue of the liver is increased in amount in the affected area, and the contraction occurring in this leads to scar-like depressions on the surface, so that the organ may assume a hob-nail appearance. On section the dense fibrous tissue will be clearly marked off from the surrounding unaltered liver-substance. The gummata are seen as rounded, non-vascular, yellowish patches (No. 3134). They vary in size up to that of a walnut, but are rarely larger. They are, unless degenerated in the centre, elastic and firm, and may, indeed, be very tough, in marked contrast to the softened tubercular patches. In the early stages of the process the affected area is injected and swollen, and lymph is effused round the portal capillaries.

The gummata may become completely absorbed or, in other cases, become calcareous, from the deposit of lime-salts in the cheesy material.

Congenital Syphilis.—The livers of children who are the subjects of hereditary syphilis are enlarged and anæmic, and of greatly increased consistency and elasticity. The change is dependent on an increase in the amount of fibrous tissue. In some cases of congenital syphilis the bile-ducts are congenitally narrowed by the overgrowth of fibrous tissue round them, as the result of congenital perihepatitis.

3134. A slice of liver-tissue, embedded in the substance of which are rounded gummata. The liver-substance itself is apparently normal. The gummata are of a pale yellowish-white colour, non-vascular and clearly marked off from the liver-tissue. On the peritoneal surface covering the largest mass is a little inflammatory lymph. A distended bile-duct filled with inspissated bile is seen on one surface of the section, the gummata being grouped round it. 6433

History.—The specimen is from a man who died of bladder and kidney mischief consequent on stricture. There was a gumma in the gastrocnemius muscle. (Surg. Cat. No. 963 B.)

3135. A piece of the left lobe of a liver, showing syphilitic changes. The surface is irregular from cicatrization in parts and gummatous nodules in others. The organ is uniformly pale and dense in consistency, partly from fibroid overgrowth and partly from fatty and waxy degeneration.

For Wax Model see page 144, *No.* 3594.

TUBERCULAR HEPATITIS.

In the course of any tubercular affection the liver may become enlarged by albuminoid degeneration, but in cases of miliary tuberculosis tubercular nodules are frequently found, especially in children, scattered through the substance of the organ and dotting its surfaces (No. 3136). The liver is enlarged, owing to congestion. The miliary tubercles are clustered round the capillaries of the portal vein and are seen as small yellow spots resembling mustard-seeds. When on the surface the peritoneum over them is frequently inflamed and coated with lymph (No. 3136). The section often shows the tubercle to be bile-stained. In such cases it has probably originated round a bile capillary.

In rare cases the tubercular nodules may soften and produce cavities in the liver; more usually the patient dies from the general condition before the liver-state has led to any symptoms.

Occasionally tubercular foci may become calcareous.

3136. A piece of the liver of a child, showing subperitoneal miliary tubercles. The nodules are discrete and about the size of a pin's head. They are of a pale yellow or opaque white colour, and project slightly from the surface. The peritoneal coat is for the most part normal in appearance, but at one place is covered by a thin layer of lymph. 3865

MORBID GROWTHS IN THE LIVER.

CANCER.—Cancer affecting the liver may be primary in origin, but is much more commonly secondary to disease elsewhere. It usually occurs as isolated nodules (Nos. 3137, 3138, 3139) often attaining a large size, or it may uniformly affect the whole organ (No. 3144); such cases are never secondary. Soft glandular cancer is the usual form, and it may present colloid changes (Nos. 3145, 3147). Secondary epithelioma of the columnar variety is rare, and the squamous form practically never occurs. The liver may be enormously enlarged. Nodules of cancer projecting on the surface of the organ are usually umbilicated in consequence of degenerative changes in the central portions with continued growth at the circumference (Nos. 3137, 3139). The peritoneum becomes opaque, thickened, and covered with lymph. On section the cancerous mass will be seen to project beyond the surface; it is quite circumscribed, but not encapsuled (Nos. 3138, 3139), and the surrounding liver-substance is in a state of fatty degeneration. The cancer is dull white in colour, more or less streaked with red according to its vascularity, which is usually great. The morbid growth undergoes degenerative changes similar to those met with in cancer affecting other parts of the body.

The neighbouring lymphatic glands are enlarged (No. 3147).

SARCOMA (Nos. 3149, 3150) may affect the liver, and its macroscopic appearances are similar to those above described. In cases of wide-spread melanotic sarcoma the liver is often affected (No. 3151).

ANGIOMA (No. 3153).—Tumours composed of erectile tissue and capable of being injected through the portal vein or hepatic artery are sometimes met with in the liver, usually on the surface and near the free border.

On section they resemble the tissue of the corpus spongiosum (No. 3153), and are filled with blood from the portal vein. They consist of a delicate framework of fibrous tissue covered with a single layer of elongated squamous epithelium. They are not of any clinical importance.

DUCT-CYSTS.—Occasionally rounded cysts filled with inspissated bile are found in the substance of the liver. They are retention-cysts due to obstruction of one of the bile-ducts as the result of inflammation or pressure from without.

DOUBTFUL CYSTS.—In rare cases the liver may be the seat of numerous small cystic spaces similar to those met with in the brain (No. 3520). The origin of these is doubtful, they are not apparently connected with the ducts. It has been suggested that, in some cases at least, they may be post-mortem and due to an accumulation of gas in the tissues as a result of rapid decomposition. Occasionally small cysts are found in the livers of patients with extreme cystic disease of the kidneys (No. 3425).

3137. A small piece of liver showing cancerous masses projecting on the surface; they are depressed in the centre owing to degeneration, and raised at the margins, where growth was still active at the time of death. 2251

3138. A slice of liver showing two large rounded masses of new growth which are circumscribed, but not encapsuled. They bulge beyond the surface of the section, are very soft and spongy in appearance. The liver-substance is apparently healthy. 2319

3139. A slice of liver-substance showing nodules of new growth. They are round, circumscribed, but not encapsuled, soft and spongy in appearance, and bulge slightly beyond the surrounding liver-substance, which is unaffected. The largest nodule is distinctly depressed in the centre. The spongy appearance is due to degeneration.

3140. A slice of a soft cancer growing in connection with the liver. The growth is marked off by thick bands of connective tissue into distinct lobes, the substance of which is soft and spongy in texture. The portal and hepatic vessels and a piece of small intestine are seen in section. 738

3141. A slice of a liver which has been injected. Two small round nodules of new growth are seen on the cut surface; the injection has not entered their substance. The surface of these nodules is slightly reticulated as the result of degeneration. 2252

3142. A piece of an injected liver attached by broad adhesions to which is a piece of the diaphragm. On the cut surface of the liver are three large nodules of cancer, they also project upon the peritoneal surface.

The new growths are circumscribed, not encapsuled, and raised above the surrounding liver-substance. They are pitted on the surface from degeneration. The vessels of the growths are not injected except quite at the margin.

3143. A piece of cancerous liver which has been injected. The nodules of new growth are round and circumscribed, and project on the surface; they are smooth and traversed by small vessels. On the cut surface it will be noticed that the centre of the nodules is much less vascular than the periphery, and consequently more liable to undergo degeneration. Some of the nodules bulge rather above the line of section, others are depressed in the centre, but bulge at the margins. 3675

3144. A portion of the right lobe of a liver from a case of primary carcinoma. The organ was much enlarged.

The surface is pale, smooth and polished, and has a mottled appearance. On the cut surface numerous rounded nodules of soft new growth are seen; the intervening liver-substance is extensively fatty. In parts the nodules of new growth have coalesced so as to form larger cancerous tracts. 6522

History.—The specimen is from a woman, aged 38. Four years before death she had been gradually failing in health and losing flesh. Twelve months before admission to the hospital, under Dr. Bastian, she had felt pain in the right hypochondrium. She continued work as usual until eighteen days before her death; she was admitted three days before death in a semi-comatose state and jaundiced. The peritoneal cavity contained almost two pints of fluid. There were no secondary deposits. *Vide* Dr. Bastian's *Case-book*, 1889. Amy Chapman.

3145. A slice of liver-substance extensively affected by cancer undergoing colloid degeneration. The new growth occurs in rounded nodules, distinctly marked off from the liver-substance. At one part these nodules are so numerous that the liver-substance has been entirely replaced by them. The masses are soft and spongy and slightly depressed. 1799

3146. A slice of liver-substance with its peritoneal coat and a small piece of the diaphragm. Between the peritoneum and liver is a mass of colloid cancer; in some parts this is invading the organ. It is spongy and cellular in texture, but of considerable density. The peritoneum has been raised up by the growth, but is unaltered in appearance. The outline of the liver is clearly marked except where it has been invaded by the growth; its substance is normal. 5483

3147. A large portion of a liver with the pancreas and a chain of lymphatic glands, all parts being the seat of cancer in a state of colloid degeneration. The liver contains numerous rounded masses of new growth, some projecting on the surface, others deeply embedded in its substance. The nodules projecting on the surface present many translucent areas indicating the existence of loculi containing clear colloid material. Those which have been cut across are sponge-like in texture, the colloid material filling the spaces having escaped. One large nodule from which a wedge-shaped piece has been removed shows a very early stage of the process. Similar changes are seen in the glands. Attached to one side of the pancreas is a colloid nodule which has been laid open. 4006

3148. A small piece of liver-substance with the peritoneum covering it, under which is a growth of colloid cancer. The liver-substance is only invaded at one spot. The new growth is made up of loculated cystic spaces containing a clear gelatinous material. The walls of these spaces and also the trabeculæ subdividing them are very delicate. The liver-substance is apparently healthy. 742

3149. A piece of the right lobe of the liver showing a large round mass of sarcoma embedded in its substance and projecting on the surface. The surface is breaking down and a piece of diaphragm is adherent to it. The growth is soft, stained by blood, and not encapsuled. Many other nodules were scattered through the substance of the organ. The growth is secondary to sarcoma of a retained testis, *vide* Surg. Cat. No. 1928 A. Both lungs were extensively invaded by secondary deposits, *vide* No. 3400. 6229

3150. A slice of liver showing secondary sarcomatous growths. They form prominences on the surface, the peritoneum over them being wrinkled. The cut surface is soft and spongy. 5936

3151. A slice of liver-substance affected by sarcoma, some of the nodules of which are deeply pigmented. The growth is a melanotic sarcoma. The nodules are rounded and vary in size from that of a pin's head upwards. On close examination a delicate but perfectly distinct capsule can be made out round most of the nodules.

3152. A slice of liver-substance which is infiltrated by a melanotic new growth. The pigment is arranged in delicate interlacing lines, but in places is more heaped together. On one side of the section are two oval pigmented masses of soft new growth; they are quite circumscribed but not encapsuled. 1867

Microscopic Examination.—The growth is composed of alveolar spaces with delicate fibrous walls, enclosing large epithelium cells. The pigment is principally in the alveolar walls, but in some parts is also seen in the cells. The growth is a cancer.

3153. A small piece of liver situate in which is a nævus. The growth is flat and not more than ¼ inch thick. At the cut surface it is seen to be distinctly marked off from the substance of the organ; it is spongy in appearance. 3984

The patient, a woman, æt. 30, died from the effects of arsenic poisoning.

3154. A small piece of liver containing a small thin-walled cyst embedded in its substance. The cyst measures about ¾ inch in its longest diameter; one half of it is loculated. The wall is very thin and delicate and is translucent. At one spot a piece of it has been dissected free from the surrounding healthy liver-substance, and a piece of black paper placed under it. 3764

3155. A small piece of the anterior margin of a liver, embedded on the under surface of which is a small round cyst, which has been bisected. The cyst is distinctly marked off from the surrounding liver-substance. The wall is smooth externally and of fibro-cartilaginous density. Scattered over the inner surface are numerous ossific nodules making it irregular. Two of these nodules, placed almost opposite each other, are considerably larger than the rest and project slightly into the cavity. 1762

For Wax Models of New Growth in the Liver see page 144, *Nos.* 3595 *to* 3601.

PARASITIC DISEASES OF THE LIVER.

Hydatids.

Hydatid cysts are much more commonly met with in the liver than elsewhere. Wherever occurring the cyst is developed from the eggs of the Tænia Echinococcus. This parasite is about ¼ inch in length and infests the intestines of dogs, wolves, and sheep. It consists of four joints, the ova being contained in the last, which exceeds all the rest of the body in size. The head is provided with a double circlet of hooklets, and outside these are four suckers placed at regular intervals.

The ova being swallowed pass into the intestinal canal and are thence taken by the blood-stream and usually deposited in the liver.

Hydatids of the liver are usually single, but two or more may be met with (No. 3161). Occasionally similar cysts may occur in other parts, notably the spleen, mesentery, and lung. Any part of the liver may be the seat of the cysts, but they are most usually seen in the right lobe. They may be deeply embedded in the liver-substance, which is unaltered, or they may project on the surface, or be merely under the peritoneum and pedunculated (No. 3164).

The cyst varies very much in size; in some cases it may be so large as to more or less fill the abdomen, or should it be forming in the posterior part of the organ, it may seriously encroach upon the thoracic cavity and impede respiration. The cyst consists of two parts distinctly separable from each other: the outer or adventitious cyst-wall (Nos. 3161, 3165, 3167) is composed of dense fibrous tissue and is plentifully supplied with blood-vessels; internally is the true or parasitic cyst (Nos. 3162, 3163). This is homogeneous and gelatinous in appearance, and composed of seven or eight layers (No. 3163). This membrane is very delicate and very easily torn, showing a tendency to curl up in the opposite direction to its natural curve.

The cyst contains a clear watery fluid of a specific gravity of about 1010 at the most, and containing sodium chloride. When drawn off by the aspirator, numerous minute white specks are seen in the fluid; these are the scolices of the Tænia undergoing development, and they resemble the head-joint of the fully developed parasite. They are usually clustered together and are attached to the inner surface of the cyst-wall by a slender stalk.

In most cases numerous secondary or daughter cysts (No. 3158) are found floating free in the fluid of the parent cysts; these may contain scolices or another generation of cysts, but are not infrequently barren. The hydatid may, however, present characters differing from the above account, the variations depending upon degenerative changes occurring in the cyst-wall or its contents.

Thus the adventitious or false cyst-wall may become calcified (Nos. 3166, 3167), or may be so thick and dense that the further enlargement of the parasitic cyst is effectually prevented. This may occasion the death of the parasite. In other cases the daughter cysts have collapsed and, being flattened together, seem to form concentric layers filling the cavity; the fluid becomes in great measure absorbed, and a mortar-like caseous material fills up the cyst (No. 3164).

In other cases the cyst may press upon a bile-duct which, subsequently bursting into it, will kill the parasite and perhaps induce suppuration. A branch of the portal vein may be similarly opened, and in such cases it is possible that the scolices may become carried to distant parts by the blood-current.

Any of these conditions may result in spontaneous cure, the cyst then shrivelling up; but unfortunately this is not common. Sooner or later, if left alone, the cyst ruptures in the direction of least resistance; the effects of this will naturally depend upon the position of the tumour. Hydatids have been known to rupture:—

1. Into the pleura or lung, producing rapid and fatal empyema.
2. Into the pericardium.
3. Into the peritoneal cavity, producing fatal peritonitis.
4. Externally through the adominal wall or intercostal spaces.
5. Into the stomach or intestine.
6. Into the vena cava or portal vein.
7. Into the bile-ducts.

In old-standing cases repeated attacks of inflammation of the peritoneal covering of the cyst cause adhesions to form between it and the abdominal wall or surrounding parts, so that the tumour might burst without necessarily flooding the peritoneal sac.

3157. A portion of liver-substance containing a small hydatid cyst which projects slightly on the peritoneal surface; the cyst is oval in shape measuring an inch in its longest diameter. The parasitic cyst-wall is seen shrivelled up in its interior, but the adventitious fibrous wall maintains its original shape. The surrounding liver-substance is quite healthy. 1772

3158. A portion of liver to the under surface of the left lobe of which is attached a circular hydatid cyst. The cyst is subdivided into three unequal parts by broad bands of fibrous tissue. The small cysts were all found in the cavity of the large one. The cyst-wall is thin. 1142

3159. A piece of liver occupied by a hydatid cyst. The parasitic cyst-wall is lying loose in the adventitious fibrous cyst. The fibrous cyst-wall is thin; it is covered at the adherent part of the tumour by a layer of liver-tissue. Internally it is smooth but wrinkled. The cyst measures 3½ inches in diameter. The liver-substance is healthy. 3668

3160. A small hydatid cyst removed from the left lobe of the liver (post mortem). The adventitious wall has been laid open, and internally is seen the true wall, which has shrunk away from its fibrous envelope. The fibrous wall is dotted here and there with calcareous matter. 4773

3161. A portion of the right lobe of a liver, situate in which are three hydatid cysts from which the parasitic or true cyst-wall has been removed. The three cysts are close together, but are quite distinct from one another, the cyst-walls, however, being in contact without any intervening liver-substance. The largest cyst measures rather more than two inches in diameter, the others rather less. Where the liver-substance has been cut into in laying open the largest cyst, it will be noticed that the adventitious wall is thin and distinctly marked off from the surrounding healthy liver-substance. The interior is corrugated. The peritoneal covering is normal. 4773

3162. The parasitic cysts from the preceding specimen. They are homogeneous, gelatinous-looking, and opaque but translucent. The opacity is deeper in some parts than others, giving the walls a spotted appearance. 4773

See also No. 3404 for hydatid in lung and history of the case.

3163. The parasitic cyst-wall from a case of hydatid disease of the liver. The cyst contained one pint of fluid. The specimen is very soft and gelatinous to the touch and easily lacerated. At the upper part of the specimen it will be seen to consist of superimposed layers of a homogeneous nature. At one part four layers have been dissected one from the other. The interior of the cyst presents the same characters as the exterior. 1800

3164. A piece of the anterior margin of a liver with the gall-bladder, which is contracted and full of irregular, dark-brown gall-stones. Attached to the free margin and under surface of the liver is a round hydatid cyst from which a part of the anterior wall has been removed. The cyst is filled up with a mortar-like material produced by the degeneration of the parasitic wall and daughter-cysts. The fibrous wall is thickened. The liver-substance is healthy. The cyst was not diagnosed during life. 6350

3165. A small piece of the liver, in which is an oval cyst, measuring two inches in its longest diameter. The cavity has been opened and part of the wall turned aside. The interior of the cyst is opaque, tough, and corrugated. The peritoneum covering the cyst is slightly thickened and opaque. The wall is thin and can be readily separated from the surrounding liver-substance, which is healthy. In the MS. catalogue the specimen is described as a hydatid; the cyst will represent the adventitious wall, the true parasitic cyst being absent. 1115

3166. A piece of a liver with the gall-bladder, part of the wall having been removed. It is impossible to pass a bristle along the cystic duct into the bladder, and in the MS. catalogue it is stated that the duct was obstructed at the time of death. At the upper end of the gall-bladder, close to the orifice of the cystic duct, the mucous membrane is warty in appearance. Close to the left side of the gall-bladder, at the free margin of the left lobe of the liver, is a rounded cavity having a distinct dense fibrous wall. Its interior is irregular from the presence of nodules of fibro-cartilaginous density, and in some parts distinctly ossific nodules project from the cyst-wall. At one part a bristle has been passed between the cyst-wall and the contents. 734

3167. The adventitious fibrous cyst of a hydatid found in the right lobe of the liver. The cyst is oval in shape, measuring nearly six inches in its longest diameter. The wall is completely calcified; at the cut edge it is seen to be distinctly stratified. A thin membrane invests it externally and also internally. 1613

3168. A piece of the liver containing a small cyst. The cyst is situate at the surface, so that it is only partially surrounded by the liver-substance, which is healthy. The wall is thin, dense in structure, and distinctly marked off from the neighbouring parts. Internally it is corrugated. The cyst is probably the adventitious fibrous investment of a hydatid. The patient had lived in India. 2244

Wax models, p. 145, Nos. 3602, 3603.
Hydatids of Peritoneum, p. 6, Nos. 3021 to 3024.
(*Vide also* Surgical Catalogue, Part II. p. 534, *Hydatids.*)

Series XLII.—DISEASES OF THE GALL-BLADDER.

Biliary Calculi.

The solid constituents of the bile may form concretions in any part of the biliary passages, but most commonly in the gall-bladder.

In some cases the concretion takes the form of gravel, but usually forms distinct stones. In rare cases there is only one stone, which may more or less completely fill the gall-bladder (No. 3192), but usually there are a considerable number (No. 3181). Gall-stones vary considerably in size, the size being as a rule inversely proportional to the number. A single stone is rounded or oval in shape (No. 3170); but when there are many they are smoothly facetted (No. 3177). They vary in colour according to the amount of pigment, thus they may be whitish (No. 3181) or of a green or black tint (No. 3183).

These stones are somewhat soapy to the feel and can easily be indented by the finger-nail; in some cases they are very brittle, especially when dried. Gall-stones are a little heavier than water, but when dried they often float on account of air getting into their interstices. Stones formed of pure cholesterine are lighter than any others. A gall-stone consists of a nucleus, body, and crust. They are usually laminated, and the centre is often the darkest part, consisting of almost pure pigment; from this the laminæ composing the stone often radiate (Nos. 3170, 3172). In some cases epithelium from the bile-ducts serves as the nucleus of the stone, while blood-clots, entozoa, and foreign bodies have been met with as nuclei. The crust varies in thickness, sometimes exceeding that of the body; it varies in colour according to its composition. Gall-stones are usually quite smooth on the surface (No. 3177), but sometimes they are rough and tuberculated (No. 3183).

The most common constituents of gall-stones are cholesterine and bile-pigments; but biliary and fatty acids, lime, soda, magnesia, carbonic and phosphoric acids, epithelium, and mucus also enter into their composition. The various appearances of the stones vary with their chemical composition; stones from the same patient have the same composition.

1. *Stones consisting of pure or almost pure cholesterine* are colourless and transparent. They are beautifully crystalline and the laminæ radiate from the centre of the stone. These stones are the lightest met with, and their surface is covered with glittering cholesterine crystals (Nos. 3170, 3172).
2. *Stones consisting of cholesterine, bile-pigment, and a little lime or magnesia.* This is the composition of the majority of gall-stones. The colour is pale or deeper according to the relative amounts of cholesterine and bile-pigment. The pigment may be uniformly distributed through the stone or may be in layers alternating with the cholesterine.
3. *Stones consisting of altered bile-pigment and of lime-salts.* These are small, black, brittle, and tuberculated, resembling in outward appearance the oxalate of lime calculus met with in the bladder, but they are much smaller, being about the size of peas (Nos. 3183, 3184).
4. *Stones consisting chiefly of carbonate of lime.* These stones are roughened and angular, and of a brown colour. They are heavy and break with a crystalline fracture.

3170. A cholesterine calculus, from the gall-bladder of a woman who died of phthisis. The cholesterine is arranged in plates radiating from the centre, where there is a linear darker nucleus, the discoloration being due to inspissated bile. The general appearance of the fractured surface is waxy and of a pale straw-colour. At some parts the crust is distinctly marked off from the body of the stone, but at others it cannot be made out. The stone becomes denser towards the periphery. 5356

3171. Part of a cholesterine calculus from the gall-bladder of a man who died from cancer of the mesentery. The crystalline character of the stone is well marked. 6207

3172. A biliary calculus which has been split in half. It was the only one in the gall-bladder. It is oval in shape. The external surface appears roughened and granular; is of a pale yellow colour, and waxy in appearance. To the feel the stone is like that of hard soap. The consistence is somewhat brittle and the split surface shows the beautiful crystalline (talc-like) appearance of cholesterine, of which the stone is almost entirely composed. The cholesterine is arranged in thin flakes radiating from the deeply pigmented spot in the centre, which represents the nucleus. 4060

3173. A biliary calculus which has been split in half; it was the only one present in the gall-bladder. It is oval in shape and the surface is fawn-coloured, but each end is blackened. The smooth surface is slightly granular on close inspection. The section shows at least two concentric rings of a brownish colour. The crust is composed of a pale opaque waxy substance, which presents a slight radiate marking, and which can be easily separated from the rest of the stone, exposing a granular surface. The body of the stone is composed of the crystalline substance cholesterine, having a radiate arrangement, broken by at least one concentric line of pigment as above mentioned. The centre of the calculus is deeply pigmented. 4060

3174. An oval biliary calculus composed principally of cholesterine. The crust is waxy-looking and greasy to the feel.

3175. A gallstone. The outer surface is honeycombed, possibly from other smaller calculi having been adherent to it. The stone is in some places deeply bile-stained, but in others quite translucent. It is composed of cholesterine. 5423

3176. Five biliary calculi. Two of them are crenated on the surface.

3177. Five gall-stones removed from the same gall-bladder; one of them has been split open to show its interior. The stones are cuboid in shape, facetted and everywhere smooth. They are extremely light in weight. The fractured stone is seen to consist of three distinct parts: an outer waxy crust, largely composed of cholesterine, can be easily chipped off in flakes, exposing a smooth shiny surface underneath. The layer beneath this is nearly thrice as thick, distinctly concentrically laminated and also showing radiations.

The body of the stone shows a striking radiating appearance; in the centre, where the nucleus should be, there is a space, probably produced by the evaporation of moisture from the stone. The bile-pigment is more plentiful here than elsewhere in the stone. The appearance recalls that of a split oak-gall. 4060

3178. Several biliary calculi, some of them split in half. They are all facetted, smooth, and polished on the surface.

3179. Three biliary calculi, one of which has been split open. They are rounded in shape, and present one or two facets. They are about equal in size and of a waxy appearance. The fractured surface is seen to be glistening and silky in appearance, something like asbestos. The cholesterine of which the stone is composed is arranged radially from the centre. 4775

3180. Forty-eight calculi removed from a gall-bladder. They vary considerably in size, and the smaller ones are much paler in colour. One of the largest has been cut open to show its structure. It is deeply bile-stained throughout. 4776

3181. Four hundred and eighty-five calculi from the gall-bladder. The stones, mounted on glass, show the varying sizes. They are all of a dead white colour, smooth and showing many facets. They are very friable; one has been broken in half in order to show its structure.

Externally there is a very delicate crust of a pure white amorphous-looking material; next to this is a denser structure, distinctly laminated and crystalline. The nucleus of the stone is deeply stained with bile and consists of crystals of cholesterine.

The aggregate weight of the stones is $43\frac{1}{2}$ grammes; the largest weighs $2\frac{3}{4}$ grammes, and the smallest 5 milligrammes (*vide* No. 3190.) 1413

3182. Several calculi from a gall-bladder. In shape and size they very closely resemble each other. Most of them are facetted on more than one aspect. They are of a whitish colour; one or two of the calculi are cracked, and one of the upper ones is broken. 4777

3183. Eighteen gall-stones. They are very irregular in shape, black in colour, and resemble oxalate of lime urinary calculi—the so-called mulberry calculus. They are extremely brittle, and the pieces chipped off have the same appearance as the exterior of the stone. They consist of altered bile-pigment and lime-salts. 4778

3184. Several biliary calculi closely resembling each other in shape, size, and colour. They are irregular on the surface, tuberculated like a mulberry, and of a very dark brown colour. They are very brittle and brownish black all through. They consist of altered bile-pigment and lime-salts. 5196

3185. A number of biliary calculi composed of cholesterine. They resemble in general appearance small pearls. They are very uniform in size and shape, being generally rounded, but flattened as if they had been squeezed between the fingers.

3186. Calculi removed from a gall-bladder. They are similar in character to those in the preceding specimen. 4774

3187. A gall-bladder which has been dried and laid open. At the fundus a large rounded gall-stone is impacted. It is coated with much smaller stones similar to those at the bottom of the bottle. These stones are rounded in shape, but facetted, and in size and colour resemble the pips of a dried fig. The inner surface of the gall-bladder has a honeycombed appearance where the stones have been in contact with it. One larger stone is also seen. 4083

3188. A gall-bladder which has been dried and a piece of its wall removed. The wall is thin. Attached to the inner surface are numerous gall-stones: at the fundus the wall has a reticulate appearance due to the presence of stones which have dropped out. 1355

History.—The specimen was removed from the body of a man who died in the St. Pancras Infirmary; he had been jaundiced before death and had suffered from pain in the hepatic region for many months.

3189. A portion of a gall-bladder which has been dried. It is packed full of calculi of different sizes. 4084

The Effects of Calculi.

Not infrequently stones may remain in the gall-bladder without producing any symptoms; more usually they tend to pass along the duct and so escape with the excreta. In some instances the stones may excite suppurative inflammation in the walls of the gall-bladder (No. 3190). This may then become adherent to the colon, duodenum, or some other part of the alimentary canal, and a fistulous communication being established (No. 3192), the stone may escape into the gut; it may then be passed *per anum*, or may become impacted in the lower end of the ileum, producing symptoms of intestinal obstruction, often ending fatally. In these cases the gall-bladder becomes contracted and atrophied, and a permanent fistula into the gut remains. Again the stone may escape into the peritoneal sac, producing rapidly fatal inflammation.

Sometimes a stone may become lodged in any part of the cystic duct (Nos. 3190, 3191) and cause immense distension of the gall-bladder behind it; this goes on to suppuration unless speedily relieved. The abscess in rare cases bursts through the abdominal wall.

The ducts may be found considerably thickened and dilated from the presence of stones in them. A similar hypertrophy and dilatation occurs in the gall-bladder itself, owing to chronic obstruction to the passage of its contents. This dilatation may spread still further backwards to the bile-ducts in the substance of the liver, which may become varicose and plainly visible on the surface of the organ.

3190. A gall-bladder, part of the wall of which has been removed. A calculus is impacted in the mouth of the cystic duct, and a second one a little further on. The mucous membrane has been in great measure destroyed by ulceration, the muscular bundles being plainly visible. The gall-bladder contained the numerous stones exhibited in No. 3181. 1413

3191. A portion of the liver with the gall-bladder, which has been laid open. The cystic duct is blocked by three calculi. The largest of these is close to the opening into the gall-bladder. The two others, much smaller in size, are a little lower down the duct, but all three are in contact. The situation of the smaller stones is easily recognizable. The gall-bladder itself is not enlarged, nor does it show any marked pathological condition, although in the notes of the specimen it is said to have been ulcerated. The walls are a little thickened. The peritoneal coat of the liver is covered here and there with fine flakes of inflammatory lymph. The liver-substance is normal. 4044

History.—The specimen was removed from a man under the care of Dr. Parkes, March 27th, 1851.

3192. A piece of the liver with the gall-bladder and a portion of small intestine. The gall-bladder, oval in form, is very small and is filled up by a calculus, the surface of which has been exposed by removal of part of the wall. There is a narrow fistulous track between the fundus of the gall-bladder and the gut; a piece of glass has been passed along this. This opening probably originated by sloughing and ulceration set up by gall-stones, as a result of which they passed into the gut and escaped. 2209

CANCER OF THE GALL-BLADDER.

Primary cancer of the gall-bladder is rare; it is sometimes met with in association with gall-stones and has been attributed to the irritation produced by them (No. 3193).

The gall-bladder may be secondarily affected by malignant disease spreading from the liver, colon, or head of the pancreas. The growth by obstructing the ducts will lead to considerable hypertrophy of the walls and dilatation of the cavity of the gall-bladder. In some cases fistulous communications may be established between the gall-bladder and the intestine in consequence of cancer.

3193. A small piece of the liver with the gall-bladder, which has been laid open and a piece of glass passed through the cystic duct. The upper part of the gall-bladder is the seat of an irregular shreddy growth, limited to the upper segment and surrounding the orifice of the cystic duct. Embedded in the new growth is a biliary calculus. The outer surface of the gall-bladder is unaffected, nor has the disease spread to the liver. 3671

Microscopic Examination.—The tumour is composed of a connective-tissue stroma arranged in alveoli, and containing numerous large nucleated cells. It is therefore a cancer.

SERIES XLIII.—DISEASES OF THE PANCREAS.

INFLAMMATION.

Acute inflammation, in some cases terminating in suppuration, is occasionally met with. The abscess may form either in the substance of the gland or round it; it may burst into the intestine, stomach, or peritoneal cavity. Gangrene is said to occur. Chronic inflammation leading to considerable induration and enlargement, and sometimes to obstruction of the duct, is also met with. In some cases of ulcer of the stomach the pancreas may form its floor, and occasionally death result from hæmorrhage from the eroded pancreatic artery.

ATROPHY.

Atrophy may occur to a slight degree as the result of old age. It may also occur if the artery should become diseased, or as the result of pressure on the gland-substance, and in certain dyspeptic states.

FATTY DEGENERATION.

Occasionally occurs in conjunction with fatty changes in the other viscera. The change may be very extensive.

3195. A pancreas which has undergone such complete atrophy and degeneration as to be unrecognizable. The specimen was removed from a patient who died of diabetes. 5422

OBSTRUCTION OF THE PANCREATIC DUCTS.

Obstruction of the pancreatic ducts is not uncommon and may result from chronic inflammatory induration affecting the head of the gland and causing constriction of both pancreatic and bile-ducts, or from their implication in a new growth (No. 3198). As a consequence of the obstruction the canal behind will become more or less distended and its walls hypertrophied. In some cases small cysts may form by dilatation of the acini. The solid constituents of the pancreatic juice may form calculi which project into the lumen of the tube and still further obstruct the flow through it. Such calculi contain a large quantity of carbonate of lime, and consequently effervesce on the addition of acids (No. 3197). Oxalate and phosphate of lime and phosphate of magnesia are also found in these concretions. The walls of the duct may sometimes be found to be calcified. The calculous formations may be found in the smaller ducts, but are frequently confined to, and always most numerous in, the main duct. They are usually small, whitish, and irregular, somewhat like small pieces of coral.

3196. A pancreas which has been laid open so as to expose the interior of the duct. The gland itself is healthy. The duct is calcified at its extremity, the calcified portion being about the size of a hazel-nut and close to the opening, through which a piece of glass has been passed. The duct behind this is much dilated, but its interior is quite smooth. 2239

3197. A pancreatic duct which has been laid open to show masses of calcareous material in its interior. The wall is thickened and pouched, the small pouches being filled with earthy salts, which project from them into the lumen of the tube. It is probable that the existence of these small pouches determined the earthy formations in the same way that stones are frequently found in bladder-sacculi. Chemical examination shows the concretions to consist of pure carbonate of lime. Many are seen lying loose at the bottom of the bottle. 1766

MORBID GROWTHS IN THE PANCREAS.

The pancreas may be affected by glandular cancer as a primary disease, the hard form or scirrhus being most commonly met with. Encephaloid and colloid also occur. The disease may affect any part of the gland, but is perhaps most commonly seen in the head. In this situation it may implicate the duodenum and may cause constriction of the bile and pancreatic ducts (No. 3198). The glands are early affected, and the disease may extend to the diaphragm or to the vertebral column, and it has been known to cause serious obstruction to the aorta.

Sarcoma may also be met with in the pancreas, but no tumour similar to that commonly met with in the parotid gland has been found to attack this organ.

3198. A piece of the liver with the gall-bladder, head of the pancreas, and piece of the duodenum. The head of the pancreas is the seat of a mass of scirrhus cancer, which has obstructed the orifices of the pancreatic and common bile-ducts leading to dilatation of them with thickening of their walls and similar changes in the gall-bladder itself. A piece of glass has been passed through the opening of the duct into the duodenum, but the MS. Catalogue states that in the recent state this could not be done, the duct being obliterated for ¾ inch. The pancreatic duct behind the obstruction presents small sacculations and depressions of its mucous membrane. 4065

3199. The head of a pancreas affected by cancer. The nodules of new growth are easily recognized by their white colour, but in parts are stained by blood-pigment. The outer surface is nodular. 6487

Microscopic Examination shows the growth to be a scirrhus cancer. The alveolar spaces are well marked, and the walls formed of dense fibrous tissue. The alveoli are filled with epithelium cells.

3200. A large mass of new growth affecting the pancreas. The growth is coarsely lobulated, but smooth on the surface; it is dense in structure, no part of it showing changes consequent on degeneration. The normal pancreatic tissue cannot be distinguished. 5028

Microscopic Examination.—The growth is composed of oat-shaped cells not enclosed in alveolar spaces; it is a sarcoma.

SERIES XLIV.—DISEASES OF THE SPLEEN.

ATROPHY.

The spleen may remain in an undeveloped state throughout life. In advanced life it is said to shrink a little.

Atrophy, properly so called, is an extremely rare condition, and is said sometimes to depend upon repeated and profuse hæmorrhages. The organ has been found only weighing one drachm and consisting of the shrunken capsule with a very small quantity of splenic pulp.

SOFTENING.

In febrile conditions, especially that accompanying infective processes, the spleen becomes enlarged and its consistency much diminished. In extreme cases it may be quite diffluent, and occasionally rupture. The condition is usually associated with an increase in the number of leucocytes in the blood. The spleen is constantly enlarged and diminished in consistency in Typhoid Fever.

3201. The spleen and splenic artery with the termination of the cœliac axis, which has been laid open: the vessel is atheromatous. The spleen is much atrophied, measuring only $1\frac{1}{2}$ inches in length and an inch in breadth: its capsule has been removed. The splenic artery is very varicose, but its walls are not notably thickened. The vessel is nine inches long in its coiled condition. 2080

SPLENIC ENLARGEMENT.—LEUKÆMIA.

Under normal conditions the spleen becomes enlarged shortly after a meal. Sometimes the organ undergoes permanent enlargement or hypertrophy. By true hypertrophy is meant an increase in size without any alteration in structure. It would appear that such a change is dependent upon some abnormal blood-state or upon some peculiarity of the splenic tissue, rather than upon mere mechanical congestion. Prolonged fevers, the acute specifics, ague, syphilis, and any infective process produce enlargement of the spleen; but the most marked cases are met with in Splenic Leucocythemia. Albuminoid degeneration also causes considerable increase in size; but in most of these conditions there is some definite alteration in the normal structure of the organ, and they must not be regarded as instances of so-called hypertrophy. The enlargement may be enormous, cases being recorded in which a spleen weighed thirteen pounds.

Long residence in the Tropics gives rise to splenic enlargement, without any apparent alteration in structure, and independently of febrile attacks.

Leukæmia or *Splenic Leucocythemia.*—The size of the spleen in leucocythemia may be enormous, the greatest size recorded being eighteen and a half pounds. In such cases the organ may contract adhesions to surrounding parts. It is uniformly enlarged, is smooth on the surface, except where lymph has been deposited, and preserves its normal outline. The notches and indentations present in its anterior border are exaggerated and can usually be readily felt through the abdominal wall. On section the consistence will usually be found to be slightly increased, very rarely diminished; the surface is shiny and the organ contains less blood than normal. It is of a purple hue where the changes are not advanced, but elsewhere is greyish or brownish red in colour. White lines may be seen on the cut surface, due to thickening of the trabeculæ. Occasionally the Malpighian corpuscles can be distinguished; but usually this is not the case. In rare cases small spots of softening and suppuration may be found. Wedge-shaped infarctions are sometimes met with. The enlargement of the spleen is due simply to an increase of the normal splenic pulp, and in a less degree of the trabecular structure also. In leucocythemia the spleen also contains peculiar crystals. They are elongated octohedra, colourless, and measure about ·016 to ·005 inch in width. They are also found in the blood and other tissues post mortem; they have never been found before death. They are supposed to be composed of some crystalline organic substance. They are insoluble in cold water, alcohol, ether or glycerine, but soluble in hot water and in most acids and alkalies.

LEEDS & WEST RIDING
MEDICO-CHIRURGICAL SOCIETY

Waxy, Lardaceous or Albuminoid Degeneration.

The spleen is very frequently affected by waxy degeneration. The change may be more or less uniform throughout the substance of the organ, but very frequently is limited to the Malpighian corpuscles, which become swollen, transparent, and gelatinous, in appearance resembling boiled sago-grains (Sago-Spleen, No. 3202). In advanced cases the organ is enlarged and increased in weight, and is tough and dense to the touch, like raw bacon. On section it has a transparent shining appearance, and is anæmic.

When the change is limited to the Malpighian corpuscles, these are seen scattered through the substance of the organ as small glistening rounded bodies, about the size of a millet-seed: in such cases the organ is often of normal size.

(*Vide* Albuminoid Liver, p. 34.)

3202. A portion of a "sago-spleen" from a case of phthisis. The organ was considerably enlarged, measuring 6¼ inches in length. The cut surface is denser than normal, and is uniformly studded by small, rounded, translucent areæ where albuminoid degeneration has occurred in the Malpighian bodies. 5628

3203. A piece of spleen showing albuminoid change. The Malpighian corpuscles are seen as dark points about the size of a pin's head. The organ is enlarged and firmer than usual. 6523

Inflammation of the Spleen.

Abscesses may originate in the spleen as the result of infective embolism. Such abscesses are usually small, but by confluence may ultimately attain a considerable size. Suppuration may also arise in the case of hydatid cysts of the organ. Abscess arising independently of one of the above causes is extremely rare, but is occasionally met with in those who have resided in the Tropics, or as the result of injury. Such abscesses may remain for long undiagnosed, as the symptoms they produce are equivocal. The peritoneum covering the organ is found coated with lymph, but general peritonitis very rarely occurs. The abscess may burst through the diaphragm into the pleural cavity or the lung, and the pus then be expectorated. In other cases it may be discharged through the stomach or colon or may burst into the pelvis of the kidney or general cavity of the peritoneum, or may open in the loin. These abscesses, from their long duration, closely resemble those met with in the liver; the wall becomes much thickened and indurated, and the contents are often thick and lumpy.

Chronic Capsulitis.

It is not uncommon to find, especially in patients the subjects of chronic alcoholic poisoning, that the capsule of the spleen is the seat of chronic inflammation. The change is most marked and sometimes limited to the convex surface of the organ. The capsule is much thickened and extremely dense, resembling fibro-cartilage. It is composed of lamellæ of dense fibrous tissue. The change is often seen extending to the trabeculæ of the spleen. The change may be general or local, as in the opaque patches so often met with in the heart.

The thickened capsule may become more or less extensively infiltrated with lime-salts, and the same condition may affect the trabeculæ and vessels (Nos. 3204 and 3206).

In some cases of peri-splenitis the organ contracts adhesions to the diaphragm.

3204. A piece of a spleen, the capsule of which is much thickened and of cartilaginous density. It is opaque and white, and at one part of the surface is irregularly pitted. The vessels seen on the cut surface are thickened and partly calcified, their mouths standing widely open. 1802

3205. The other half of the preceding specimen. 1801

3206. A spleen which has been laid open. The organ is much smaller than natural and has lost its characteristic shape. The capsule is much thickened, although unequally so. It is extremely dense and tough, and on its outer surface irregular bosses are seen; these consist principally of very dense earthy material, which cannot be cut with a knife. The splenic artery is smaller than natural, and is the seat of annular calcification; this also extends to the minute ramifications of the vessels in the pulp; they can be seen standing out from the soft substance as little rigid hair-like processes. 2378

3207. The capsule of a spleen from a dissecting-room subject. It is much thickened and indurated, being fibro-cartilaginous to the feel. It was adherent to the substance of the organ, as is shown by some of the tissue being still attached to it. The outer surface is irregularly honeycombed, the raised parts being smooth and opaque. The condition is the result of chronic inflammation. 3622

Tubercular Inflammation of the Spleen.

Tubercular disease of the spleen is almost always associated with tubercle elsewhere. It is more commonly met with in children. The organ is enlarged, and scattered through its substance are seen discrete tubercular nodules. These are first dense in structure, but subsequently undergo fatty degeneration and form yellow caseous masses which by coalescence produce large degenerated areas (No. 3211).

3208. A piece of spleen which is very much denser than natural and is infiltrated with tubercle. The nodules are rounded and can be easily recognized by their pale colour. Some of them are seen projecting on the surface of the organ. 1364

3209. A spleen, which is extensively infiltrated with tubercle. The nodules can be seen scattered over the cut surface; they are about the size of a pin's head. The peritoneal surface is coated with inflammatory lymph. 5321

3210. A piece of a tubercular spleen. Small nodules of tubercle can be seen projecting on the surface under the peritoneal coat. The cut surface is densely studded with tubercular foci; these are discrete and can be recognized by their pale colour. 2278

3211. A piece of the spleen of a monkey, which is extensively affected by tubercle. The outer surface is rendered irregular by the projection of tubercular nodules over which the peritoneum is slightly roughened; elsewhere it is smooth and polished. The cut surface is spongy in appearance owing to the breaking down of the tubercles. Here and there small isolated nodules are seen broken down in the centre, but for the most part these have coalesced so as to form larger patches. In these more extensive areas small abscess-cavities are seen. 2295

3212. A piece of a spleen, showing (? tubercular) nodules. The capsule is smooth and opaque. Numerous rounded smooth masses project on the surface of the organ; on the cut surface some of these are seen in section. They are of a yellowish colour and non-vascular, but are surrounded by vessels; they are encapsuled and rounded in outline; they do not show traces of central degeneration. In the MS. catalogue this specimen is described as one of tubercular disease. Owing to its state of preservation nothing definite can be made out by microscopic examination. 743

MORBID GROWTHS IN THE SPLEEN.

CYSTS (No. 3213).—Cystic tumours of the spleen are rare. *Hydatids* are occasionally met with, and are then usually associated with hydatid disease of the liver. They may occur in the substance of the organ or under its capsule close to the surface. *Simple cystic disease* is extremely rare. *Blood-cysts* have been recorded.

MALIGNANT TUMOURS.—Soft glandular cancer may occasionally be met with in the spleen, either in a diffused (No. 3215) or circumscribed form; it is almost invariably secondary in nature. Colloid cancer may occur (No. 3214). In some cases the growths are melanotic. Sarcoma has been occasionally met with.

HODGKIN'S DISEASE is a condition affecting the spleen and lymphatic glands alike. They become enlarged, and on section are seen to contain nodules of pale suet-like growths in connection with the trabeculæ. They are often angular in shape, but are not near the surface, nor are they stained with hæmatoidin crystals, as are infarcts. They consist of a fibrous stroma containing lymphoid cells. The density of the masses varies with the relative proportion of cells to stroma. The patches are in reality lympho-sarcomata, closely resemble cancer in appearance, and are malignant. Sometimes the condition is associated with tubercle, or similar growths in the liver.

3213. A large cyst in the spleen, measuring $3\frac{7}{8}$ inches in its longest diameter. Its wall is dense and partly calcified, and is strictly marked off from the splenic tissue. The interior of the cyst is rough and coated with a mortar-like deposit. It contained caseating material. 5492

3214. A spleen affected by colloid cancer. The organ has been laid open. At the lower part of the specimen the splenic pulp is easily recognizable and normal in appearance. Elsewhere the spleen is occupied by numerous cysts, many of which intercommunicate. These cysts surround the organ and vary very much in size and in the thickness of their walls. They contained colloid material. (*Vide* No. 3604.) 4074

History.—The patient was an unmarried woman, æt. 49. *Vide* Path. Trans. 1851–1852, p. 319.

3215. A slice of a spleen affected by diffuse carcinoma. The cut surface has a mottled appearance, and is traversed by fine bundles of pale fibrous tissue. The organ was considerably enlarged. 5572

Microscopic Examination.—The normal structure of the spleen is almost lost, being replaced by cancerous tissue. The walls of the alveoli are delicate, containing numerous large epithelium cells. Soft glandular cancer.

For Wax Model of Cancer, see page 145, *No.* 3604.

SPLENIC INFARCTIONS.

Emboli occurring in the spleen may, as elsewhere, possess infective properties, as in cases of pyæmia, or may simply be plugs of fibrine washed away from the valves of the heart or elsewhere. The results will depend largely upon the nature of the embolus. Emboli are seen at the surface of the organ, especially along its anterior margin. There may be only one or very many, and they vary considerably in size. Seen in section the infarcts are wedge-shaped (No. 3217), and the appearances presented depend upon the age of the lesion. In the early stages the affected area, which is itself rather pale, is surrounded by a zone of deep congestion; the vessel is plugged with the embolus. In non-infective cases the colour gradually becomes paler and of a yellowish colour, and tends to shrink and disappear, its place being marked by a scar, which causes puckering and depression of the organ. In other cases, again, especially if the embolus comes from an infective area, inflammation with suppuration ensues, and the process spreads to the neighbouring parts. The normal splenic tissue persists in the area of the infarcts, but after a time it undergoes fatty degeneration and absorption; hæmatoidin crystals are present in the affected areas.

3216. Half of an enlarged spleen, showing infarctions. The largest one is somewhat wedge-shaped, distinctly circumscribed, and of a yellowish colour. Its extent is easily seen by the colour of the surface. A smaller infarct of similar appearance is seen lower down; between these two and close to the concavity of the gland is a small infarct of deeper colour than the rest, and not definitely outlined. The infarcts are of very firm consistency. 6341

3217. Portion of a spleen, showing a wedge-shaped infarct on the surface. The infarct is pale in colour, firm in consistence, and distinctly circumscribed. The density of the spleen is not increased. 6524

Series XLV.—DISEASES OF THE PERICARDIUM.

Chronic Thickening of the Pericardium. "Milk-Spots."

In the case of adults it is quite common to find localized white patches on the surface of the heart implicating the visceral pericardium. These are most usually seen in large hypertrophied hearts and in those subjected to much friction. These "corns" or milk-spots are found in those places most subjected to friction; thus they are common in the middle of the anterior surface of the right ventricle, and on the apex of the left venticle anteriorly (No. 3222): perhaps the most common situation is at the base posteriorly over the right auricle (No. 3220).

It is questionable whether these thickened patches should be regarded as inflammatory in origin or not. They appear of a dead white colour, for the most part circular in outline and varying in size, being usually about ½ inch in diameter; if cut across the membrane is found to be somewhat thickened, but the muscle underneath not affected, as a rule, although it is in some cases slightly fatty.

3220. The right auricle of a heart. The pericardium covering the auricular appendix is considerably thickened by chronic inflammation. These patches are pearly white in colour and quite smooth. The rest of the outer surface of the auricle is affected in a less degree. 593

Pericarditis.

Inflammation of the pericardium may be acute or chronic. Chronic pericarditis usually follows on the acute form, but is occasionally chronic from the first. The acute form is most usually met with as a complication of acute rheumatism or Bright's disease; it may also occur in the course of any infective process, or may be the only morbid condition present. In the early stages of acute pericarditis the small vessels are minutely injected with blood: this is soon followed by inflammatory exudation. The parietal and visceral layers become coated with lymph and the serous sac is more or less distended with fluid.

The changes are most marked at the base of the heart round the great vessels, and also on the posterior surface (No. 3222). The appearance presented by the lymph varies in different cases: thus it may be shreddy and ragged (No. 3225), especially if the sac has been filled with fluid, the lymph processes then floating freely in it: again, if there is not much fluid the two lymph-covered surfaces come in contact, and then have a ribbed appearance, or a honeycombed reticulate surface, as if the buttered sides of two pieces of bread had been stuck together and then separated (Laennec) (Nos. 3224 and 3225).

Under very favourable circumstances complete resolution may occur, but more usually the two surfaces become adherent to one another by organization of the bands of lymph after the fluid exudation has become absorbed (Nos. 3230 and 3231). Lastly suppuration, almost invariably fatal, may occur.

If pericarditis lasts for some time the inflammation may affect the muscular substance of the heart, causing it to become fatty; this change, however, does not usually extend deeply.

In the most common cases, those in which the two layers of the pericardium become adherent, the obliteration of the sac may be complete or partial. This condition appears to be rather of pathological than clinical interest. The extent of the adhesions depends in great measure upon the mobility of the part inflamed, and also upon the effect of gravity. In such cases the fibrous layer becomes considerably thickened from chronic inflammation, and may contract adhesions to the pleura and lung or to the anterior thoracic wall. In some cases the membrane becomes very thick and dense, and so intimately adherent to the heart-muscle that it cannot be separated from it without tearing it (No. 3230). In these cases the cardiac muscle itself may be affected by the inflammatory process. Sometimes fibrous septa are found passing from the adherent sac into the substance of the heart. The partial adhesions may be long and band-like, so that the heart gets full-play in the sac. These septa are met with mostly near the apex and along the septum ventriculorum.

Calcification may also occur in the inflammatory material, forming bony rings and plates on, and often extending into, the heart's substance. These rings are usually seen at the base just below the coronary arteries, and crossing the middle of the conus arteriosus (Nos. 3233–3235).

Tubercular Pericarditis (Nos. 3236 and 3237) is similar to tubercular disease of serous membranes elsewhere. The tubercles will be found in the course of the smaller vessels. The inflammatory material has a special tendency to degenerate and may sometimes undergo calcification (No. 3237).

Hydropericardium.—In cases of general dropsy the sac of the pericardium may become distended with serous fluid. The amount of fluid may be very large, but it is not usually more than ten or twelve ounces. The pericardium normally contains only from one to two ounces of fluid.

Hydropericardium has been met with in cases where the valve of Thebesius, which naturally guards the opening of the coronary sinus, has been absent.

3221. A heart showing a deposit of lymph on the surface. Many shreds of lymph accidently rubbed off are seen at the bottom of the bottle. The surface of the organ where these shreds have separated is seen to be still shiny and generally smooth, but at the apex of the ventricles the serous membrane is roughened and opaque, a condition commonly met with and quite independent of acute inflammation. 592

3222. An enlarged heart covered with inflammatory lymph from pericarditis. Large flakes of lymph have been separated from the organ. These are seen to be thin and have a distinctly stratified appearance, the various bands of lymph anastomosing also give it a reticular or honeycombed look. The serous surface from which the lymph has been separated is still smooth and shining. At the apex anteriorly is a white opaque thickened patch, known as a 'corn.' 1612

3223. A heart covered with a thin layer of inflammatory lymph as the result of acute pericarditis. The lymph has a delicate reticular appearance, and can be easily separated from the serous surface. 592 *b*

3224. A heart showing a uniform deposit of lymph on its outer surface. The lymph presents the characteristic honeycombed appearance met with in pericarditis and inflammation of serous membranes generally; it is most abundant over the right auricle The left ventricle is hypertrophied and dilated. 2059

History.—The patient was a young man who died suddenly from phthisis. The cardiac condition was not suspected during life.

3225. A heart the surface of which is covered by a thick deposit of lymph, the result of acute pericarditis. The lymph has a honeycombed flocculent appearance and is most abundant at the base over the right auricle, there is very little over the left ventricle, the pericardium here being smooth and polished. The lymph separates readily, and the pericardium underneath is seen to be smooth and polished. A layer has been separated from the posterior part of the left auricle. 2190

3226. A heart with part of the aortic arch. The left ventricle has been laid open. The aortic valves are somewhat thickened, and on their ventricular surface is a slight deposit of lymph. The outer surface of the heart is covered with a thick layer of organized lymph. It has an irregular nodular appearance and is finely reticulate and spongy. It is most abundant over the right auricle posteriorly, but no part is free from it. 3382

3227. A heart with part of the sac of the pericardium, reflected towards the base. The serous surfaces are coated with inflammatory lymph, which is deposited in projecting wart-like masses and is most abundant over the right side. The lymph is tough and hard. 1294

3228. The heart of a child eight months old. The surface is coated with inflammatory lymph from pericarditis. The lymph is especially noticeable on the ventricles, being much less in quantity towards the base. 3985

3229. The heart, with the pericardium and great vessels, from a young patient. The left vertebral artery is arising directly from the aortic arch. There has been extensive pericarditis over the right side, and adhesions have resulted. The pericardium has been laid open and reflected where it is non-adherent. Both the visceral and parietal layers are coated with lymph which has a ribbed appearance, especially noticeable towards the base and posterior part of the left ventricle. At the anterior part of the left ventricle the surface is shaggy, the pericardium having been adherent in this situation. The serous layer of the membrane is thickened. 594

3230. Part of the wall of a heart to which the pericardium is intimately adherent. The pericardium is considerably thickened, and its outer surface is coated with flocculi of inflammatory lymph. At one part the adherent membrane has been dissected away from the wall of the heart. 595

3231. A very much enlarged heart with the pericardium to which it is universally adherent as the result of pericarditis. At one part near the apex the pericardium has been dissected off; here the surface of the heart is roughened from adhesions and has lost its characteristic shiny appearance. The outer surface of the pericardium is rough and shaggy, having been adherent to surrounding parts. 1604

3232. A heart, with its pericardium, which has been reflected towards the base. The serous surfaces are roughened and opaque and covered with dense lymph, which had evidently produced adhesions between the two surfaces, which have been forcibly separated. 1793

3233. A heart which is enlarged and infiltrated with fat. It is encircled by a band of dense fibrous tissue infiltrated with lime-salts. This band passes in an oblique direction. Anteriorly it is about $\frac{3}{4}$ inch broad and passes along the auriculo-ventricular groove, forming a distinct furrow in the wall of the heart. Passing to the right of the heart behind the auricle the band broadens out and is less marked and blends with the cardiac substance. To the left it is still very distinct, but much narrower, and passes obliquely upwards and backwards, arching over the left auricle. Owing to the presence of this band the heart's apex is more rounded than natural. The outer surface of the heart is rough from old adhesions. 4719

History.—The specimen was removed from the body of a man, æt. 38, who had been a free drinker and had suffered from gout, but not rheumatism. He was admitted into University College Hospital in 1860. He was then suffering from general dropsy, with albumen in the urine and signs of right-sided pleurisy. He remained under treatment 3 or 4 months, being discharged, much relieved, on Aug. 30th. On Dec. 27th he was readmitted. The pulse was 96, irregular in force and rhythm. The cardiac sounds were irregular, the first being short and abrupt, and wanting in fullness. There was no distinct murmur and no signs of pericardial effusion. At the midsternal line and to the left was a very distinct friction-sound, high pitched in quality. Death occurred suddenly, Feb. 9th, 1861. No new symptoms developed. At the *post-mortem* both lungs were found to be extensively adherent. The pericardium was everywhere adherent to the heart, especially in the neighbourhood of the fibrinous ring.

3234. A piece of pericardium, between the layers of which ossific material has been deposited. The membrane is stretched over the masses and has not been worn away at any point. At one place the specimen has been broken on one side so that the ossific matter can be seen in the substance of the membrane. 1947

3235. A piece of pericardium infiltrated with lime-salts. Its surface is rough and uneven, and it is much thickened. 3991

3236. A heart and pericardium with the aorta, roots of the lungs, and several bronchial lymphatic glands. The pericardium has been removed from the anterior surface of the heart, and the left ventricle laid open. The parietal and visceral layers of the pericardium were everywhere adherent and were separated by tearing. The visceral layer is about $\frac{1}{8}$ inch thick, and where it has been cut across caseating tubercular foci are seen. Similar nodules are seen on the peritoneal aspect of the piece of diaphragm still adherent to the pericardium. The bronchial glands are enlarged, pigmented, and infiltrated with caseating tubercle. The tricuspid valves were found to be slightly thickened, the other valves were healthy. 6179

History.—Frederick Wright, aged 13, was admitted under Dr. Bastian on Dec. 24th, 1885. He had been ill for 6 months. On admission the temperature was 104°, but for some days before death was subnormal. The abdomen was distended, and attacks of diarrhœa were frequent. Cough was severe, and there was mucous expectoration but never any blood. Death Jan. 12th, 1886. At the post-mortem examination there was found general tubercular disease of the abdominal organs with matting of the intestines. Scattered caseating tubercles on the pleuræ and peritoneum, with tubercular pericarditis, and caseating tubercular nodules in the lungs, spleen, and liver. Brain healthy.

3237. The base and apex of a heart with the pericardium. On the right side the pericardium is filled up with caseous material largely infiltrated with calcareous matter; this condition also passes backward to the left side of the heart, but the anterior surface of the ventricles is free. Owing to pressure, the right ventricle is somewhat triangular in section. The muscular walls of the heart are much thickened, and this is especially noticeable in the interventricular septum. The pericardium is not thickened except where the caseous matter is found. The condition is probably the result of tubercular pericarditis. It did not produce symptoms during life.

CANCER AFFECTING THE PERICARDIUM.

Secondary deposits of cancer may be met with in the pericardium, forming small rounded nodules, usually smooth and shining on the surface, being covered with the epithelioid lining of the membrane.

In other cases large fungous masses from the lung or mediastinum may perforate the sac, usually at the base (No. 3239). The morbid growth may produce symptoms, provided it is large enough to impede the action of the heart. (*Vide* Morbid Growths in the Heart.)

3238. The trachea and roots of the lungs, with the heart, great vessels, and pericardium. At the apex of the heart the pericardium, which was adherent, has been stripped off. At the base, growing in the cavity of the pericardium and invading the muscular substance of the heart, is a spongy new growth. This completely surrounded all the vessels and nerves and reached up into the neck. Its outer surface is nodulated, and the lungs were, in parts, adherent to it. The pleura on the left side is opaque and thickened, and at the post-mortem the sac was full of fluid. The muscular tissue at the apex of the heart is not involved in the growth. 4580

History.—The patient was a man, æt. 43. On admission to the hospital the face and neck were livid and swollen, and the left arm œdematous. He had some dyspnœa, and for the past three months had occasionally brought up blood. The cardiac impulse was very faint; dullness at the upper part of the chest. No cardiac murmurs. Pulse 128, very feeble. The lividity and turgescence gradually increased, and the patient died eight days after admission. The left lung was found to be studded with cancerous nodules. The growth is a soft glandular cancer.

3239. The trachea, roots of the lungs, œsophagus, and heart, with the pericardium, from a boy æt. 14. The pericardium has been laid open from the front. All the parts, with the exception of the œsophagus, are involved in a mass of new growth. This apparently originated in the cellular tissue covering the pericardium. The vessels are surrounded by the growth, which increases in size towards the base of the heart. The cut surface is pale, dense in structure and, in parts, has a honeycombed appearance, due to degeneration. The outline of the pericardium can be still made out; the visceral layer is roughened by the invasion of the growth. The root of the right lung is invaded by the tumour. 4031

Microscopic Examination.—The growth is a soft sarcoma.

SERIES XLVI.—MALFORMATIONS OF THE HEART.

In the third week of fœtal life the heart has the form of a strongly bent tube, in which the following parts can be distinguished :—(i) the primitive auricle, (ii) the ventricular loop, and (iii) the arterial bulb.

The large veins converging to the heart are united into a common trunk, the *sinus reuniens*, which opens into the back part of the primitive auricle.

From the auricle two diverticula grow forwards, one on each side of the arterial bulb, and giving rise to the auricular appendages. The auricle communicates with the ventricle by a constricted portion of the tube, called the *auricular canal*, the wall of which afterwards takes part in the formation of the peripheral flaps of the auriculo-ventricular valves. From the anterior end of the arterial bulb the branchial arterial arches spring. The division into right and left cavities begins, in the fourth week, by the formation of an annular constriction in the ventricular loop. The corresponding projection into the lumen of the tube grows chiefly from below upwards, giving rise to a crescentic plate, the *septum inferius*, which forms the greater (muscular) part of the inter-ventricular septum. A little later a similar projection, the *septum superius*, is developed in the roof of the auricle.

Between these the *septum intermedium* grows forwards and downwards from the posterior wall of the auricle into the auricular canal, and divides the auriculo-ventricular opening.

The interval between the septum superius and septum intermedium forms the foramen ovale, while the lower part of the septum intermedium joins the hinder part of the upper edge of the septum inferius in the middle, and projecting downwards on each side of the inter-ventricular septum gives rise to the mesial flaps of the auriculo-ventricular valves (the septal flap of the tricuspid and the aortic flap of the mitral).

At the same time the arterial bulb becomes divided, by the formation of the *septum aorticum*, into the aortic and pulmonary trunks, the separation beginning above and proceeding downwards. The lower end of the septum aorticum joins the fore part of the septum inferius, forming the *pars membranacea* of the inter-ventricular septum, thus bringing the pulmonary artery into communication with the right ventricle, and the aorta with the left. The inter-ventricular septum is thus formed by the union of the septum inferius with the lower parts of the septum intermedium and septum aorticum, and is completed by the sixth week. The pars membranacea corresponds with the "undefended space" in the fully formed heart.

The left portion of the sinus reuniens has only a transitory existence, as the left superior vena cava (*duct of Cuvier*). It soon dwindles and is finally represented by the small *oblique vein* of Marshall on the back of the left auricle, and the fibrous band in the *vestigial fold* of the pericardium.

The middle portion of the sinus remains as the coronary sinus; while the right portion becomes greatly enlarged and forms the hinder part of the definitive right atrium or sinus venosus.

The right margin of the opening of the sinus reuniens into the primitive auricle forms the Eustachian valve, and the left margin, which is more developed, grows across the foramen ovale as the valve of that orifice.

The inter-auricular septum is only completed after birth by the adhesion of the valve of the foramen ovale to the left side of the septum superius. The pulmonary veins are developed independently, and form openings into the back of the left auricle. At first there is only one common aperture, but later on an opening is formed on each side and these eventually become divided, forming the four pulmonary veins.

(*Vide* wax models of the Development of the Heart: Anatomical Collection.)

Malformations of the heart are due to an arrest of development. In some cases the cause of such an arrest cannot be ascertained, but in the majority it is dependent upon a diseased condition of the organ, or to malposition of the vessels, or in some instances to a combination of these two conditions.

Thus patentcy of the foramen ovale may be caused by disease of the pulmonary valves or tricuspid orifice, giving rise to obstruction, so that the blood-supply to the lungs cannot be properly carried on after birth (Nos. 3244 and 3246).

The same conditions might also lead to permanent patentcy of the ductus arteriosus (No. 3246).

If the disease should arise before the complete formation of the inter-ventricular septum, this will remain imperfect (Nos. 3241 and 3224); or in the very young fœtus the septum may fail to grow from the same cause, so that the number of cavities in the heart may be diminished (No. 3240). The septum grows from below upwards and is finished off by membrane at the auricular level; this membranous portion is not infrequently absent; it has been called the "undefended" space and is very liable to aneurysm. The natural consequence of any malformation of the heart would be that those cavities upon which extra work was thrown would hypertrophy and dilate, while the others would tend to atrophy.

The special nature of any malformation of the heart will necessarily depend in great measure upon the period of fœtal life at which the arrest of development occurs.

A. Arrest of Development at an early period of Fœtal Life. (No. 3240.)

i. *Hearts with two cavities only, auricle and ventricle, with a single vessel supplying the pulmonic and systemic circulation.*

Such hearts are similar to those normally found in Fish.

ii. *Hearts with three cavities, there being two auricles and one ventricle, like the heart of a Frog.*

Both these conditions are of great rarity. Children with these malformations may live for some days.

B. Arrest of Development at a later period of Fœtal Life.

i. *Imperfect septa. Aorta and pulmonary artery more or less completely developed* (Nos. 3241 and 3242).

The septum between the ventricles is usually deficient towards the base, as it is last formed at this part. The aperture is usually triangular, but may be round or oval. The blood flows from the right into the left ventricle, and the cusp of the tricuspid valve may become elongated or sacculated.

The cardiac septum may be deficient at the place where the auricular and ventricular septa meet, so that the four cavities communicate.

In rare cases perforation of the septum may result in later life on account of destructive endocarditis.

ii. *Defective interventricular septum. Constriction or obliteration of the orifices. Misplaced vessels.*

a. Pulmonary stenosis. Aorta communicating with the right ventricles.—In such cases the foramen ovale is frequently patent, but may be normally closed (Nos. 3243 and 3244).

b. Complete obliteration of the orifice of the pulmonary artery (Nos. 3245 and 3246).—In such cases the foramen ovale is open, and the pulmonary artery receives its blood through a patent ductus arteriosus. The left ventricle is much hypertrophied, and the right contracted. The ventricular septum is usually closed, but, if not, the foramen ovale may be closed, the blood passing from the right into the left ventricle.

c. Constriction of the right ventricle is caused by the formation of septa in the cavity.—Such cases have been described as hearts with supernumerary cavities.

d. Defective septum dependent on stenosis of the auriculo-ventricular or aortic orifices.

e. Obliteration of the auriculo-ventricular or aortic orifices.—In such cases the aorta receives its blood through the pulmonary artery and ductus arteriosus, and the foramen ovale remains open.

f. Defective interventricular septum. Pulmonary artery arising from the left ventricle.—This condition is very much rarer than *a.*

In the Chelonian Reptiles the two ventricles normally communicate, the septum not being perfect.

C. Arrest of Development in the latter part of Fœtal Life.

i. *Premature closure of the foramen ovale.*

ii. *Premature obliteration of the ductus arteriosus* (Nos. 3247 and 3248).

iii. *Patent foramen ovale.*—Either with complete absence of the valve, or more or less development of it (No. 3249). Patentcy of the foramen may coexist with constriction or obliteration of the pulmonary orifice (Nos. 3244 and 3246).

iv. *Patent ductus arteriosus.*—This usually coexists with stenosis at the pulmonary or aortic orifices (No. 3246).

v. *Irregularities of the Valves.*—The sigmoid valves may be deficient in segments, there being only one or two. In other cases there are four segments, the fourth one usually being smaller than the others (No. 3251). The cusps of the auriculo-ventricular valves may be fused. The valves are sometimes reticulate (No. 3252).

3240. The malformed heart of a fœtus. There exists a single capacious auricular cavity furnished with two appendices, which have their normal positions relative to the roots of the aorta and pulmonary artery. The left appendix, as compared with that of a normal heart of the same age, is of full size; the right, though of full length, is constricted to a narrow process, barely admitting the passage of a probe. The venæ cavæ are normally disposed with respect to the auricles. From the back of the auricle, immediately above and to the right of the inferior cava, is the stump of a narrow flattened band, which has apparently been connected with a similar stump attached to the left side of the auriculo-ventricular aperture, the band having been divided in laying open the cavity. The nature of this is uncertain, but it may be of the character of a "moderator band." The auriculo-ventricular opening is single, well defined, and corresponds in size with the cavity of the auricle. Its plane is directed obliquely downwards and to the right, and the aperture is guarded by a well-formed valve, apparently fully competent to close it. The ventricle is single, but partially divided at the apex by a falciform muscular septum, which is less prominently prolonged on the anterior wall of the common ventricle to the situation of the partition between the aorta and pulmonary artery. The auriculo-ventricular valve consists of two main triangular curtains and intermediate lesser cusps. There are two chief groups of papillary muscles. One of these lies within that portion of the ventricular cavity to the right of the rudimentary septum, the other lies within its left division. From their position it would appear that the anterior curtain of the valve represents the external curtain of the mitral and the left segment of the tricuspid combined, the posterior curtain representing, perhaps, the remainder of these two valves.

The right papillary muscle represents, in position, the anterior one of the right ventricle, and that in the left division the left one of the left ventricle. The ventricular cavity leads into the aorta and pulmonary artery, which lie side by side, the aorta being on the right. The pulmonary artery is relatively small; its divisions are normal. The ductus arteriosus is small.

The pulmonary veins are crucially confluent on the back of the auricle in the space where it is uncovered by pericardium. 5995

Vide Pathological Trans. vol. xxxv. p. 124.

3241. Part of a heart, showing imperfect development of the upper part of the ventricular septum, so that the aorta communicates directly with both ventricles. A glass rod has been passed above the septum. 602

3241 A. A malformed heart. The inter-ventricular septum is deficient at the upper and posterior part. The cusps of the mitral and one cusp of the tricuspid valve are attached to the margins of the opening, which is rounded in shape, and large enough to admit the tip of the little finger. The valves are ill-developed and beaded at their margins from inflammation. The right auricle is dilated, being much larger than the left. The foramen ovale is patent and partly bridged over by a reticulate valve. The ductus arteriosus is patent; a piece of glass has been passed through it. The aorta and pulmonary artery are normal, and their valves healthy. 6529

History.—The day after birth a loud systolic murmur could be heard all over the cardiac region. There was no thrill. The murmur could be well heard at the back. The child was small, quiet, and pale; it died on the 30th day after birth. The only parts noticed as being at any time blue were the lower eyelids. The mother had twice suffered from rheumatic fever, and had had rheumatism during her pregnancy. Her other three children were quite healthy.

3242. The heart of a child, showing imperfect development of the inter-ventricular septum. The communication between the ventricles is anterior; a glass rod has been passed through it. 3833

3243. A preparation of a heart, showing a patent foramen ovale. The orifice is a mere slit, through which a piece of whalebone has been passed. The ventricles have been laid open; the commencement of the pulmonary artery is very small and has only two valves. The aorta communicates with both ventricles, owing to imperfect development of the septum, the opening into the right one being between the tricuspid valve and the origin of the pulmonary artery. The opening is rounded, and large enough to admit the tip of the index finger. A bristle has been passed through each opening. 601

History.—The specimen is from a boy, æt. 7. At the age of nine months, before which nothing wrong was suspected, he had a fit, becoming livid, drowsy, and breathing stertorously. After this there were from three to seven attacks daily, coming on especially in rising from the recumbent to the erect posture. When older the child was weak, unable to walk erect or run, and his countenance purple and bloated. There was dyspnœa and cough. His position of greatest relief was sitting in a squatting position, resting his chest against his knees or against a stool or edge of the table; at night he lay hugging the bolster with the object of pressing his chest, and if he chanced to alter his position during sleep, he had a fit. He died at night during a fit, his mother not having time to alter his position as was her custom.

3244. The heart of a child. The foramen ovale is patent, the opening being of considerable size; a piece of red glass has been passed through it. Owing to imperfect formation of the inter-ventricular septum the aorta communicates with both ventricles, the blue glass rod passes into the left ventricle. The opening of the pulmonary artery into the right ventricle is much smaller than normal, and is marked by a piece of white glass. The wall of the right ventricle is thicker than natural. 3841

3245. A malformed heart from a young child. The origin of the pulmonary artery is quite impervious, and there are no traces of the sigmoid valves. The aorta, which is large, communicates with both right and left ventricle owing to imperfect development of the septum. The foramen ovale is patent, and the right auricle considerably dilated. 4039

3246. A malformed heart from a child aged nine months. The orifice of the pulmonary artery is completely closed. The ductus arteriosus is pervious and is indicated by a piece of white glass. The right auricle is very large, and the foramen ovale, through which a piece of blue glass passes, is patent. The left auricle is of normal size. The right ventricle is only large enough to contain a small pea, and the tricuspid valve is rudimentary. The walls of the left ventricle are very thick; a stout glass rod has been passed through the mitral orifice. 4076

History.—J. W. G., a male child, æt. 8 weeks, was first seen by Dr. Hare on August 3rd, 1852, in consequence of a slight amount of bronchitis. The child was born at full term and nothing peculiar in his appearance was noticed, but later the feet and hands were noticed to be colder than natural, and the child's colour more dusky; when he coughed or moved much he became distinctly blue. He was constantly sleepy. Chest normally formed. About ¼ inch to the left of the left nipple a slight purring tremor was detected; impulse natural; at the apex of the heart a distinct, moderately loud, blowing murmur was heard with the first sound. It was conducted into the inter-scapular region. The child gradually became weaker and died on March 9th, 1853, when nine months old.

Vide Pathological Trans. vol. iv. p. 81.

3247. The auricles of a heart, showing a patent foramen ovale, through which a piece of glass has been passed. The coronary arteries are extensively calcified. 2236

History.—The specimen is from a man aged 50. He had never had any cardiac symptoms until shortly before his death, when he had several attacks of angina pectoris, in one of which he died.

3248. A portion of a heart showing a patent foramen ovale. There are two openings of unequal size between the auricles. The upper one, the smaller of the two, is rounded, the lower oval, its margins projecting into the left auricle like a valve. 2081

3249. The heart of a child four years of age. The cavities have been laid open by the removal of part of their walls. The foramen ovale is only partially closed by a reticular valve. There is a communication between the auricles in front and behind, the anterior opening is circular. 559

3250. A specimen of patent foramen ovale. The opening is nearly circular, measuring about ½ inch in diameter. 4165

History.—The specimen was from a woman æt. 65. She died of bronchitis, but had never shown any signs of cyanosis.

3251. The origin of a pulmonary artery, showing four sigmoid valves. One of them is much smaller than the others, which are of about equal size. 4037

3252. A portion of a heart with the origins of the aorta and pulmonary artery. The sigmoid valves of both vessels are reticulate. The valves are only incomplete at their margins close to their attachment to the vessel-wall. 4070

SERIES XLVII.—DISEASES OF THE MUSCULAR SUBSTANCE OF THE HEART.

HYPERTROPHY OF THE HEART.

True hypertrophy of the heart, like that of other muscular organs, is dependent upon an increase in the muscular tissue as the result of increased work thrown upon it. The extra amount of work may be primarily due to some alteration in the innervation of the organ by which the force and frequency of its beats are increased. It is probable that a mere increase in the frequency of the contractions of involuntary muscular tissue independently of increased force cannot produce hypertrophy. Most commonly cardiac hypertrophy is secondary to increase in the vascular resistance or to obstruction at one of the orifices of the heart, or lastly to an increase in the volume of blood to be moved on. The latter may be dependent upon regurgitation of the blood in valvular disease, dilatation of the cavities of the heart, and perhaps upon simple plethora. In pregnant women the heart hypertrophies slightly in consequence of the resistance offered by the placental circulation: this is, however, only temporary, but after many pregnancies may become permanent. Hypertrophy is almost always associated with dilatation (No. 3253), but in cases of chronic kidney-disease it may exist alone, especially affecting the left ventricle.

Cardiac hypertrophy is a conservative change, the heart increasing in strength in order to overcome the resistance offered to the free circulation of the blood.

Concentric Hypertrophy is that condition in which the walls appear to be thickened at the expense of the cavity. Its occurrence is extremely doubtful, and such cases are usually regarded as being nothing more than a strong systole of the heart (Nos. 3256 and 3257).

False Hypertrophy is the name given to an enlargement of the heart caused by an increase in the amount of fat or connective tissue in its substance. Hypertrophy may be *complete*, affecting all parts of the heart; but is more commonly *partial*, attacking those parts more directly implicated by the condition causing the increased strain upon the organ (No. 3254). Thus the ventricles, especially the left, are more often affected than the auricles, and the left auricle rather than the right (No. 3255). If the obstruction to the circulation is situated in the lungs, the right heart will be affected more than the left; but it must be remembered that an obstruction at one part of the circulation will necessarily affect the whole.

Hypertrophy causes an increase in the weight of the heart and also in its size (excepting the possible occurrence of the concentric form). The increase in size is not necessarily a measure of the amount of hypertrophy present, since it may be largely dependent upon dilatation of the cavities. Again, the thickness of the muscular wall may be normal even with a considerable degree of hypertrophy, but in such cases dilatation is present so that the area of the walls is increased. The walls are, however, usually thicker than normal, the change being less marked in the septum. The musculi papillares and trabeculæ carneæ also enlarge. The average thickness of the walls of an hypertrophied heart is about three quarters of an inch (No. 3252), but may be as much as two inches. In estimating the thickness of the walls as a measure of the degree of hypertrophy, it is important to observe whether the heart is contracted or in diastole, since the former condition increases the thickness.

The weight of the heart may be enormously increased; it is usually not more than twelve to sixteen ounces, but cases have been recorded of hearts weighing forty-six ounces or more.

In addition to an increase in weight and size the heart is also altered in shape, the precise alteration depending upon the part chiefly implicated. Thus, if one of the ventricles is enlarged it alone forms the apex, which is proportionally widened. Hypertrophy of the auricles alone does not cause much alteration in shape. If there is also marked dilatation of the cavities the alteration in shape is still more pronounced, and in extreme cases the width of the heart may exceed its length.

The muscular substance is usually paler than natural, and has lost consistence, but it may be tougher than natural from a concomitant increase in the amount of connective tissue.

The individual fibre-cells are perhaps not usually much enlarged, the overgrowth being principally numerical—hyperplasia. The new fibres are said to arise by segmentation of the old ones.

Dilatation of the Heart.

By dilatation of the heart is meant an increase in the capacity of one or more of its cavities. The condition is almost always associated with hypertrophy of the muscular substance (No. 3253), but in some cases the walls may be thinner than natural, or may be unaltered in thickness. In the latter case there must of necessity be an increase in the amount of tissue present, since the area of the wall is increased.

Dilatation of any cavity occurs when the pressure of its contents is out of proportion to the strength of the wall to resist it. In the heart the cavities dilate when the muscular power of the wall is unable to overcome the resistance offered to the circulation: it is most commonly met with in valvular disease with deficient compensation.

Dilatation may also arise from a weakened condition of the cardiac walls, without any obstruction to the blood-flow (No. 3258). This is usually dependent upon some degenerative change, especially fatty metamorphosis (No. 3259). Lastly, there may be a mixture of the two conditions, the endocardial pressure being slightly increased and the walls weakened by degeneration or mal-nutrition.

If increased strain is suddenly thrown upon the walls of the heart, dilatation will ensue without hypertrophy, since the latter requires a longer time for its development.

Dilatation of the heart is usually *complete*, that is, it involves all the cavities, but the one immediately behind the resistance is naturally the most affected. In estimating the amount of dilatation, it is necessary to take into account the condition the heart, whether it be in systole or diastole. The organ will be increased in size and in weight owing to the coexistent hypertrophy. The degree of dilatation varies, in some cases the cavity may be two or three times the normal size or even more.

If there is but little hypertrophy present, the walls of the heart are flaccid, and readily collapse when the cavities are empty; if hypertrophy is entirely absent, this condition will be especially noticeable, since the wall must be stretched and thinned. On account of the dilatation of a cavity the orifices communicating with it also dilate, and in the case of the ventricles the auriculo-ventricular valves are necessarily rendered incompetent. The columnæ carneæ and musculi papillares may be attenuated and stretched, and the tips of the latter are often converted into fibrous tissue; the result of this being that the chordæ tendineæ become, as it were, lengthened, the degenerated part not having the power of contracting; but in spite of this and of some dilatation of the cusps of the valves, the incompetence cannot be compensated. In dilatation of the auricle the auricular appendix and the large veins opening into the cavity are dilated and general venous engorgement ensues. Dilatation of one cavity sooner or later affects the whole heart, since it produces regurgitation of blood, and so tells back on cavity after cavity.

A dilated heart alters its shape, becoming broader and more globular. The muscular substance is paler than natural and has usually a mottled appearance. The fibre-cells are found in a state of granular and fatty degeneration.

3253. A heart showing hypertrophy and dilatation of the left ventricle and disease of the semilunar valves. The wall of the ventricle in its thickest part measures ¾ inch. The valves have been partly destroyed by inflammation; the free margins are ragged and coated with fibrinous deposit. Lime-salts are present in the inflammatory material. The atheroma is well seen round the mouths of the coronary arteries, and it also extends to the endocardium of the ventricle close to the valves. 2142

3254. A heart with the arch of the aorta. The aortic valves are calcified throughout, and united together, producing stenosis. The ascending part of the aortic arch is dilated, especially on the convex side. The left ventricle is dilated and hypertrophied. 4589

History.—Mr. W., æt. 30, was under the care of Dr. Walshe. He had never suffered from rheumatism. The symptoms were general distress with severe pain under the scapulæ and down the arms. There was a strong systolic murmur over the cardiac base, also heard in the back.

3255. A heart showing mitral stenosis with hypertrophy and dilatation of the left auricle, and dilatation of the left ventricle. The mitral valve is thickened and calcareous; on the auricular aspect the calcareous matter is exposed by removal of the endothelium. The auriculo-ventricular orifice is contracted, only just admitting the tip of the finger. The disease of the valve does not affect its base. The chordæ tendineæ are thickened. The auricle is hypertrophied, and the cavity dilated, the musculi pectinati being much less marked than usual. The aortic valves are healthy, but the cavity of the left ventricle is dilated, the walls are slightly hypertrophied. The columnæ carneæ are thinner than usual, and the wall of the ventricle forming the septum much smoother. 2145

3256. A heart which has been divided transversely midway between the base and apex of the left ventricle. With the root of the aorta the specimen weighs 11½ ozs., but it has been preserved for many years in spirit and looks much larger in the bottle than it really is. The walls appear of great thickness, and the cavity extremely small. The external length of the ventricle is four inches. At the point of section the antero-posterior measurement is 2¼ inches, and the lateral 3 inches. On close examination the cavity of the left ventricle is seen to be stellate; from the centre three linear branches radiate, and can be opened up Between them lie the enlarged papillary muscles. This stellate cavity, on measurement with a wire, following its branches but excluding the papillary muscles, is 4¼ inches in circumference. On the left side the wall measures ⅝ inch, in front and behind just $\frac{1}{8}$ inch in thickness. It is clear therefore, after making due allowance for the shrinking in spirit, that the thickness of the wall is very little above the normal. The increased weight is proof that the extent of the wall cannot have been below the normal. It is clear also, from the state of the right ventricle, that the heart is firmly contracted, and also that the circumference of the inner surface of the left ventricle—the test of the actual reduction in size of the cavity—is little, if any, less than normal. It seems, therefore, to be merely an example of firm contraction in a heart the subject of moderate simple hypertrophy. The specimen is of great interest, as it has been instanced as a proof of the occurrence of so-called "concentric" hypertrophy. The specimen is without history. *Vide* Reynold's 'System of Medicine,' vol. iv. p. 707. 2140

3257. Part of the heart of a woman who was the subject of mitral stenosis. The thickened and calcified cusps of the valves have united. The auriculo-ventricular orifice is slit-like. The walls of the heart, especially of the left ventricle, are hypertrophied, and bands of fibrous tissue can be plainly seen mixed with the muscular tissue. The cavity of the left ventricle is very much diminished, being encroached upon by the walls of the heart. This condition is known as Concentric Hypertrophy, but it is rather of the nature of strong systole occurring at the time of death. 5474

For other specimens of Hypertrophy and Dilatation see Diseases of the Valves, pages 77 et seq.

ATROPHY OF THE HEART.

A diminution in the amount of muscular tissue leading to decreased size and weight of the heart is known as Atrophy: it is usually associated with degenerative changes. A heart in which the muscular tissue is lessened in amount may retain its normal size and weight owing to an increase in the fat and connective tissue in it; such specimens come under the head of degeneration.

A heart which is in reality atrophied may in rare cases retain its normal size owing to dilatation of its cavities.

True atrophy is of necessity an acquired condition and must not be confounded with a congenitally small heart, or one whose development has been arrested.

By *Concentric Atrophy* is meant a diminution in the size of the heart and also of its cavities, so that they bear the normal proportion of the bulk of the organ.

Eccentric Atrophy is the same condition as dilatation with thinning of the walls.

Simple Atrophy implies that the heart retains its normal size, but the cavities are enlarged by thinning of the walls.

Atrophy may be due to any condition causing general wasting, or to a diseased state of the coronary arteries leading to impaired nutrition: atrophy from the latter cause may be partial, attacking only that part supplied by the vessel affected. Disease of the coronary vessels is, however, more usually a cause of degenerative changes than atrophy.

In fatty infiltration of the heart the muscular fibres become atrophied (*Fatty Atrophy*).

An atrophied heart is diminished in bulk and weight. The muscular substance may be pale and soft or dense and dark in colour: the difference depends mainly on the kind of degeneration existing with the atrophy, and upon the amount of pigment present.

The pigment may colour the muscle reddish brown (*Brown Atrophy*), and is said to be derived from the colouring-matter of the cardiac muscle.

The muscle-cells are often granular and fatty, and the connective tissue between them increased in amount.

3258. The left ventricle of a heart. A large extent of the muscular tissue has undergone marked atrophy, most marked at the apex and anteriorly. In this situation the wall is extremely thin, measuring little more than $\frac{1}{16}$ of an inch; its interior is perfectly smooth and polished, the columnæ carneæ having undergone complete atrophy. The columnæ carneæ still present are attenuated and atrophied. The cavity of the ventricle is dilated; the musculi papillares, chordæ tendineæ, and valves are unaffected. 1866

FATTY HEART.

Two distinct fatty conditions may be met with affecting the heart, the one a degenerative process from the first (Fatty Metamorphosis), the other a constructive process ultimately leading to destruction of the muscular tissue (Fatty Infiltration).

In the early stages the anatomy and effects of these two conditions are quite distinct from one another, but ultimately they are very similar and are associated.

Fatty Infiltration consists in an increase in the amount of fat normally met with on the surface and in the substance of the heart. It is part of a general obesity and dependent on the same causes. It is more common in men than women, and increases with advancing years. Under normal conditions the heart is devoid of fat at birth, but after six years of age fat is always present. Normally fat is found in the auriculo-ventricular and inter-ventricular grooves, especially in the course of the blood-vessels.

In cases of fatty infiltration the fat may almost completely cover the organ and extend into its substance between the muscular fibres, compressing them and causing them to undergo fatty metamorphosis and absorption (No. 3259). In advanced cases the heart may appear to be composed of a mass of fat, but the microscope usually reveals muscular fibres among the fat. In other cases the fatty change is not uniform, but occurs in more or less isolated patches, the muscular tissue being streaked with fat; sometimes little masses of fat are seen under the endocardium, causing small smooth projections into the cavities.

The fatty overgrowth is always more marked on the surface than towards the interior of the heart.

The amount of fat interpolated among the muscle-cells naturally embarrasses their action and leads to weak action of the heart, and this will be still further noticed if fatty metamorphosis coexists.

The chemical composition of the fat is identical with that met with in other parts of the body.

Fatty Metamorphosis consists in a transformation of the muscular fibre-cells into fat. The change may affect all parts of the heart, or may be local. The different parts of the organ are affected in frequency and severity in the following order:—left ventricle, right ventricle, right auricle, left auricle. The inner layers of the muscular tissue and the columnæ carneæ are more affected than the outer parts, in marked contrast to what occurs in fatty infiltration. This is dependent on the fact that the inner parts of the wall are supplied by the terminal branches of the coronary artery, and hence show the first signs of degeneration. The following are the changes which occur:—at first the transverse striation becomes indistinct, and scattered irregularly through the fibre are minute black dots. Subsequently the cross striæ are lost, the dots are arranged in rows parallel with the long axis of the fibre, rarely across it, and they become clear and highly refractive in the centre and form an oil-globule not exceeding the size of a red blood-cell.

These fat-globules are within the cell, but in advanced conditions the cell is broken, and the fat passes into the surrounding tissue. A heart which is the seat of fatty metamorphosis has lost consistency and is pale in colour; the colour has been likened to that of a dead leaf. The substance of the organ is frequently mottled from the unequal distribution of the change.

The process may be so advanced that it can be readily recognized by the naked eye, but in other cases the microscope is necessary for its detection.

The size of the heart is frequently normal, but may be increased owing to dilatation of the cavities, since the walls are weakened and offer less resistance to the endocardial pressure.

The extent of the degenerative process will depend in some measure upon its duration, but more especially upon its cause. The causes may be found in some morbid condition of the blood (*Toxæmic variety*) or in a deficiency in its amount (*Anæmic*), or it may arise as a part of the degenerative process accompanying old age (*Senile*).

3259. The right side of a heart showing advanced fatty degeneration of the walls. The muscular substance of the wall of the ventricle is diminished in thickness, being replaced by fat. The wall of the auricle has hardly a trace of muscular tissue left, but is increased in thickness by a large deposit of fat. The coronary artery has been dissected out for a short distance. It is extensively calcified. The specimen is from the same case as No. 3125. 6520

For Wax Model of Fatty Heart, see page 145, *No.* 3605.

MYOCARDITIS.

Inflammation of the muscular tissue of the heart may be acute or chronic, and may affect the greater part of the organ or only a small area. It usually occurs from an extension of endo- or pericarditis as the result of rheumatism, but may be the only pathological condition present. It may also occur in the course of pyæmia or any infective process, its occurrence being due to the impaction of emboli. Morbid growths may excite inflammation of the tissue immediately surrounding them.

Acute Myocarditis may, in addition to the causes already mentioned, be caused by the irritation and friction produced by large fibrinous vegetations on the valves, causing ulceration and inflammation. The left ventricle is most usually affected. The muscular tissue is injected and softened, and infiltrated with inflammatory exudation. If the inner surface is especially affected, it may result in the formation of an ulcer (*Ulcerative Myocarditis*, No. 3265), and the products of the destructive process will then enter the circulation and may give rise to embolism. By a gradual extension of the process outwards acute pericarditis may be set up, or the softened wall may give way and the patient die from hæmorrhage into the serous sac. When the inflammation occurs in the substance of the wall, acute abscess may result (No. 3266). This is dependent on the impaction of an embolus (almost if not always of an infective nature) in one of the branches of the coronary artery.

Acute abscess is usually met with in the wall of the left ventricle or in the inter-ventricular septum and does not exceed the size of a hazel-nut. The abscess may burst into the cavity of the ventricle (*acute aneurysm of the heart*) and the contents mixing with the blood may cause embolism, or it may empty into the pericardium exciting suppurative pericarditis (No. 3266), lastly it may burst both ways.

If the abscess is situate in the inter-ventricular septum it may burst into one or both ventricles; in the latter case a fistulous communication is established between the cavities.

In very rare cases abscesses are said to become caseous, lime-salts being eventually deposited in the cheesy mass.

In favourable cases the inflammation may become arrested, the plastic lymph becoming organized into fibrous tissue.

Myocarditis always induces more or less fatty degeneration of the muscular tissue.

Chronic Myocarditis may follow on the acute form, or may be dependent upon endo- or pericarditis, or upon some general condition such as syphilis and chronic alcoholism.

It is characterized by an increase in the interstitial connective tissue (cirrhosis), producing, as the result of pressure, degeneration of the muscular fibres. The condition is precisely analogous with what occurs in chronic inflammation of other organs. In such cases the chief stress of the disease usually falls upon the musculi papillares, columnæ carneæ, and inner part of the wall. The tips of the musculi papillares are first affected, because they are more remote from the main blood-vessels. The parts are pale and shrunken, denser and less elastic than normal, the muscular substance having been entirely replaced by scar-tissue. Similar appearances may be seen on the surface of the organ, if the condition is due to chronic pericarditis. Similar pale strands of scar-tissue may be seen traversing the thickness of the wall.

Syphilis may induce the series of changes described as being due to Chronic Myocarditis, but we may also meet with localized syphilitic inflammation producing gummata (No. 3267). These do not differ from gummata in muscle elsewhere. They are strictly localized, though not encapsuled; the cut surface is smooth, pale yellow in colour, non-vascular and elastic. After some time they may break down in the centre. The surrounding muscular substance is fatty. Gummata may also be found upon the valves (No. 3332).

3265. A portion of a heart with the origin of the aorta. The muscular substance of the ventricle close to the aortic valves is extensively destroyed by inflammation. The valves are thickened, and the one opposite the ulcerated surface of the ventricle is in great measure destroyed, but the free margin is intact. 2178

3266. A portion of the left ventricle of a heart. The wall has been ruptured; the rent being about midway between the base and the apex of the ventricle and between the two musculi papillares. The external opening is quite small and slit-like; internally there is a small cavity with roughened irregular walls. This is most likely an abscess-cavity which has burst. The substance of the heart is not unnaturally soft, and its thickness is normal. The specimen is from a dissecting-room subject. The pericardium was full of blood. 600

3267. The heart of an infant, in connection with the right ventricle of which there has been formed a small circumscribed, slightly nodular, and granulated ovoidal tumour, about a centimetre in its chief diameter, which slightly overhangs its base and projects into the ventricle from the anterior wall immediately below the corresponding cusp of the pulmonary valve, the inferior side of which it involves. 5523

Microscopic Examination.—The growth is composed of delicate connective tissue, in the meshes of which lie many-branching granular nucleated cells, of which the processes form a secondary closer reticulum. The appearances are well explained on the supposition that the substance around the nuclei is intercellular, coagulated and shrunken by the reagents, the tumour then consisting of connective tissue, and round and oval corpuscles lying in an abundant intercellular substance, as in another form of myxoma. The growth is probably gummatous. The child had congenital syphilis. The other organs were healthy. *Vide* Path. Trans. vol. xxxii. p. 77.

ANEURYSM OF THE HEART.

Saccular aneurysm of the heart affects the left side on account of its greater liability to inflammation and strain. The usual situation is the apex of the left ventricle, the muscular wall being thin in this part (No. 3273); if the auricle is affected, it is usually a dilatation of the sinus or auricular appendix. Aneurysm is dependent upon diminished power of resistance in the cardiac wall as an outcome of chronic endocarditis, leading to a fibroid change in its walls. The production of aneurysm has been compared with that of the sacculi met with in hypertrophied and dilated bladders, the wall bulging at the weakest part, *i. e.* between the fasciculi on the inner surface. Such aneurysms vary considerably in size; they have been met with as large as an orange, but do not usually measure more than an inch in diameter (Nos. 3270 and 3272); the opening of the sac is usually small. The wall is principally composed of fibrous tissue, but often contains a little muscle. The sac may contain laminated fibrine which may lead to its complete obliteration as in arterial aneurysms (No. 3272). The sac may rupture into the pericardium (No. 3271). The main cavity of the ventricle is always more or less dilated from weakening of its walls by chronic inflammation.

Acute aneurysm of the heart occurs when an abscess in its wall bursts into the interior; such cases cannot, however, be looked upon as aneurysms in the ordinary acceptation of the term.

Aneurysm of the Valves (No. 3321). The aortic and mitral valves may be dilated so as to form saccular aneurysms. Such a condition is due to inflammation which leads to softening of the valve, which is then no longer able to resist the pressure of the blood-current. The valve may either rupture or may gradually become distended so as to form a sac; the latter is more likely to occur if the cusp of the valve has been partially strengthened by a deposition of fibrine. Such aneurysms are usually small, but have been met with as large as a pigeon's egg. The whole cusp may be dilated, but it is usually only partial. The sac bulges towards the auricle if the mitral valve is affected, but towards the ventricle in the case of the aortic valve. The wall may be composed of the entire thickness of the valve, or the endocardium may bulge through between the fibrous-tissue bundles. These aneurysms frequently rupture. They are usually found in association with valvular incompetency.

3270. Part of the left ventricle of a heart with the origin of the aorta. The aortic valves, on their ventricular aspects, are covered with fibrinous vegetations. The sinuses of Valsalva are slightly dilated. Close beneath one of the valves is a small aneurysmal dilatation of the wall of the ventricle; this is separated from the auriculo-ventricular orifice by a band of muscular substance which bounds the aneurysm below. The wall of the left ventricle is hypertrophied. 4592

3271. Part of the left side of a heart with the commencement of the aorta, which is dilated but not atheromatous. The aortic valves are puckered and thickened and the seat of fibrinous deposit, which has lime-salts deposited in it. Immediately below one valve is seen a circular opening measuring about $\frac{1}{4}$ inch in diameter. This leads into a thin-walled aneurysmal sac about an inch long and $\frac{1}{2}$ inch in diameter, lying between the aorta, auricle and auricular appendix. At its summit is an opening large enough to admit a pen-holder; this is due to the bursting of the sac. The muscular walls of the ventricle are hypertrophied. 4027

History.—The boy, æt. 14, from whom the specimen was taken was brought into Univ. Coll. Hospital, dead. About a week before he had præcordial pain, palpitation, and a fainting fit. He died suddenly from rupture of the apex of the sac. The pericardium contained three ounces of blood. (*Vide* Path. Trans. 1850–51, p. 80.)

3272. The left side of a heart. The auricle and ventricle have been laid open by an incision through the septum. There is a large aneurysm of the left ventricle, opening into it close to one of the musculi papillares. Close to the opening the endocardium is opaque and thickened by chronic inflammation. The aneurysmal sac measures fully four inches in diameter. Behind it is the left auricle, and on its right side the pulmonary artery laid open. The cavity is lined with layers of firm decolorized fibrine. The pericardium is adherent to the heart and to the sac-wall of the aneurysm. 597

3273. Part of the left ventricle of a heart with a piece of the aorta. Towards the apex of the ventricle the wall is much thinned at one spot, and has formed an aneurysmal dilatation; on holding the specimen up to the light it can be seen that the wall is so thin as to be translucent. At the upper part of the ventricle, behind the mitral valve, is a second dilatation incompletely subdivided by a ridge; the wall here is also thinned, but to no great extent. The mitral and aortic valves are normal. 2129

3274. A heart with the great vessels, showing a small sacculated aneurysm of the aorta which springs from the anterior wall just above the sigmoid valves. The aneurysm burst into the pericardium, close to the pulmonary artery. A piece of glass has been passed through the opening, which is very small. The cavities of the heart are much dilated; the walls are very thin, and in some places, notably in the left auricular appendix, the wall is composed only of visceral pericardium. The valves are healthy. 617

Spontaneous Rupture of the Heart.

Spontaneous rupture of the heart is dependent upon weakness of some part of the wall on account of degenerative changes, the fibres not being able to resist the strain upon them during systole. Fatty changes are by far the most frequent (No. 3275), but rupture may also occur when the wall has been weakened by inflammation, ulceration, or suppuration (No. 3266), or by aneurysm of the wall (No. 3278). The rupture is most usually met with on the left side, more usually in the ventricle, near the apex, and in the anterior wall (No. 3275). The papillary muscles may be the only part torn. The rent runs parallel with the muscular fibres, *i. e.* transversely, and varies in length up to an inch or more. When the heart is torn or wounded as the result of violence, the right ventricle is, from its position, usually affected (No. 3279). In some cases of spontaneous rupture only the outer or inner part of the wall may suffer. The degenerative change inducing cardiac rupture is more local than general, since in the latter dilatation usually results, in the former the stronger contraction of the less degenerated part of the wall leads to undue strain on that part least able to bear it.

Hæmorrhage into a degenerated patch of the muscular wall may determine rupture by breaking down the weakened fibres.

Spontaneous rupture, depending, as it does, on degenerative changes, is more common after the age of fifty than before, and is often associated with valvular disease.

3275. The left ventricle of a heart laid open. Anteriorly, close to and parallel with the septum, the wall has ruptured. Internally the rent is hardly noticeable, being concealed by the columnæ carneæ, but externally measures an inch in length and runs almost vertically downwards. There are a few flakes of fibrin on the visceral pericardium, near the apex. One of the coronary arteries has been laid open; its coats are thickened. 4734

History.—The specimen is from a woman æt. 65, who had always enjoyed good health. Five days before death she applied to a medical man on account of "cold and cough." One day while at dinner she suddenly fell back dead.

At the post-mortem the lungs were found congested at the bases; the pericardium contained three ounces of clotted blood.

Microscopic examination showed fatty degeneration of the cardiac muscle, the fat being distributed irregularly. *Vide* Path. Trans. vol. xiii. p. 51.

3276. A heart showing a rupture extending through the anterior wall of the left ventricle about its middle. The rent measures rather more than $\frac{3}{4}$ of an inch and passes somewhat obliquely downwards and to left. The heart is covered with thick layers of fat, and the walls of the right ventricle, which has been laid open, are in an advanced state of fatty degeneration. 5339

History.—The specimen is from a woman aged 71 years, whose lower extremities were partially paralyzed. Vomiting came on on Saturday and continued till Sunday, 5.30 A.M., when, the exertions of vomiting causing her to strain more than usual, she dropped the vessel she was holding, fell back and died.

At the post-mortem the pericardium was found full of blood-clot.

3277. A part of a heart showing a rupture at the apex of the right ventricle close to the septum in the anterior wall. The walls of the right ventricle are thin, especially where the rupture has occurred. The muscular substance is less firm than natural. The valves are slightly thickened. 63

3278. A dilated heart, showing a rupture of the left ventricle close to the apex posteriorly. The rent is more extensive superficially, the actual communication with the ventricle being only about ¼ inch in length. The ventricle is much dilated and its lower half is coated with firm blood-clot similar to that met with in an aneurysmal sac.

The specimen is one of aneurysm of the ventricle which burst.

3279. A heart showing an extensive laceration of the anterior wall of the right ventricle produced by a fragment of bone in a case of fractured sternum. The rent is three inches in length, and extends along the anterior wall, and near the apex curves backwards implicating the posterior wall for a short distance. 598

3280. A heart showing a rupture of the end of the left auricular appendix. The situation of the rent is indicated by bristles. 4071

History.—The patient was a man who was thrown from a cart, falling upon his right shoulder. The clavicle was fractured. In addition to the rupture of the heart, the liver was very extensively lacerated. The pericardium was also torn. The heart and liver were carefully microscoped by Dr. (Sir Wm.) Jenner and others, and were found to be quite healthy and free from any trace of fatty degeneration. The patient was dead when brought to the hospital.

Coagula in the Heart.

Clotting in the heart before death is usually met with in cases in which the ventricles are dilated. In such hearts there is always a tendency for the blood to stagnate in the pouch-like recesses between the columnæ carneæ, since they do not, as in the normal heart, become emptied and obliterated during systole. When a coagulum has once formed, it may continue to increase in size from the gradual deposition on its surface of layers of fibrine. The fibrine deposited on the coagulum is decolorized, but the initial coagulum itself is not so; consequently these clots, or, as they are sometimes called from their general appearance, 'polypi,' present a dark interior surrounded by laminated decolorized fibrine. The central parts of the coagulum tend to degenerate and soften, and if cut across are found to contain a yellowish fluid very closely resembling pus. This softened material consists of granular detritus more or less abundantly mixed with leucocytes. When degeneration has occurred the 'polypus' may rupture, and the fluid contents escape into the blood-current. The free portions of a clot may be washed away in the blood-current and give rise to embolism. The attached portion of the clot is quite adherent to the wall of the heart, and extends into the recesses between the columnæ carneæ, so that the coagulum is torn during removal.

Post-mortem coagula in the heart differ in many respects from those above described. They are not adherent to the wall of the cavity in which they lie, and are easily removed from it. They are decolorized at the upper part, since the red cells sink; consequently the deeper parts of the clot are dark and the upper part buff-coloured. Post-mortem coagula often extend for some distance into the vessels. They are of the same jelly-like consistency throughout, not showing any central softening. Such clots are best seen in the right heart. The blood in the left cavities often remains fluid, and is black in colour.

3281. Part of a heart from a case of mitral stenosis. Part of the wall of the left auricle has been removed to show the blood-clot which completely fills the cavity. The clot is firm and decolorized and in parts is adherent to the wall. The greater part of it is probably ante-mortem. The cusps of the mitral valve are thickened, partly calcareous, puckered and adherent to one another, producing extreme stenosis of the orifice. The auriculo-ventricular aperture measures about $\frac{1}{2}$ inch by $\frac{1}{8}$ inch. The chordæ tendineæ are thickened and shortened. The aortic valves are rendered rigid by chronic inflammatory thickening; two of them have united for some distance. 5540

3282. A preparation showing a large decolorized clot in the right ventricle extending up into the pulmonary artery. The loss of colour is due to long immersion in spirit. The clot is firmly adherent to the wall of the heart, extending among the columnæ carneæ. The top part of it is also adherent to the pulmonary artery. 3636

History.—The patient died in University College Hospital from dropsy (? renal), but there were not any symptoms pointing to an unusual state of the pulmonary artery.

3283. A heart, the left auricle and ventricle having been laid open. At the apex of the ventricle there is a dense white area of fibrous tissue extending from the endocardium through almost the whole thickness of the wall of the ventricle. Firmly attached to this is a large irregular decolorized thrombus, measuring about an inch in length by $\frac{3}{4}$ inch broad. Examination of the valves of the heart proves them to be healthy. 6089

History.—The specimen was from a man æt. 35, under the care of Dr. Bastian in 1885. For 15 years he had suffered from bronchitis. On January 6th, 1885, he had left-sided hemiplegia, and died comatose on the 8th. At the post-mortem examination thrombosis of both middle cerebrals was found.

Morbid Growths in the Heart.

Cancer and Sarcoma may spread to the heart from the surrounding parts, or may originate as secondary nodules (No. 3285). The masses of new growth do not usually attain a large size, but are frequently numerous. They are most usually met with on the outer surface, just beneath the pericardium (No. 3286). More rarely they affect the thickness of the muscular wall (No. 3285), or, lying just beneath the endocardium, project into one of the cavities.

The growths do not show the same tendency to degenerate as do similar growths in other parts of the body; but this is probably due to the fact that in the majority of cases death occurs before the masses have attained a large size.

Growing usually just beneath the visceral pericardium, cancerous nodules may set up fatal pericarditis.

Hydatid Cysts (Nos. 3288 to 3290) are sometimes met with in the muscular wall of the heart, and may rupture into the pericardium, or into one of the cavities of the organ.

Polypi (No. 3291) of the heart are very rare. They are usually met with in the left auricle, being attached to the septum (No. 3291). They may attain a large size, and project through the auriculo-ventricular aperture into the ventricle.

Polypi are covered with thickened endocardium, and are composed of delicate interlacing bundles of connective tissue; the microscopic appearances in some cases closely resembling those of an ordinary myxoma (No. 3291).

True polypi must be distinguished from adherent ante-mortem clots (*vide* p. 74).

See also Cancer of the Pericardium, p. 59.

3285. A heart showing nodules of sarcoma in its substance. The largest masses lie in the fat and cellular tissue round the base of the ventricles. A small nodule is present in the wall of the left auricle. 4056

History.—Richard Smith was under the care of Dr. Walshe in 1852. At that time sarcomata were called Soft Cancers, and the case has been thus described by Dr. Walshe. Similar growths were found in the nerves of the brachial and cervical plexuses, in contact with the right external jugular vein and the inferior vena cava. The primary growth was in the subcutaneous tissue round the mamma. (Vide *Med. Times & Gaz.* 1852, vol. ii. August 21st and 28th; Dr. Walshe's *Case-book, U.C.H.* vol. vii. p. 172.)

For other specimens from the same case *vide* Surgical Catalogue, Nos. 1328, 1329, 1354, 2040.

3286. Part of the heart of a man, who died from malignant disease affecting the cranium, lungs, and heart. Nodular masses of sarcoma are seen round the root of the aorta and round the pulmonary artery; the nodules are flattened and smooth upon the surface. There are none seen in the substance of the heart. There are four pulmonary valves, one being very small. 4017

3287. A heart, with a part of the right lung. The lung is infiltrated with new growth. The right auricle has been laid open to show a smooth, rounded, polypoid mass of new growth projecting into its cavity. The orifice of the superior vena cava cannot be found, and it would appear that the mass of new growth, continuous with that in the lung, has invaded the vein and grown into the auricle through its mouth. The new growth is soft and spongy in texture. 5409

History.—The patient was a woman, æt. 28, admitted into the hospital under the care of Sir William Jenner. She died of "carcinoma" of the right ovary. The tumour reached as high as the umbilicus. The MS. catalogue states that the tumour shown in the specimen is lymphadenomatous.

Microscopic Examination shows the growth to be composed of a delicate fibrous reticulum, the meshes being filled with small round cells. The appearances are precisely similar to those of a section of lymphatic gland.

3288. A heart laid open, showing a hydatid cyst in the wall of the right auricle. The cyst measures about 1½ inches in diameter, and bulges into the cavity of the ventricle. The true parasitic cyst, gelatinous in appearance, in still present. One of the musculi papillares has been stretched by the cyst, so that it has undergone almost complete atrophy at one part, and appears to originate from the cyst-wall at its upper part. The free margins of the tricuspid valve and the chordæ tendineæ are thickened. The adventitious cyst-wall is clearly distinguishable from the muscular substance of the ventricular wall, which appears quite healthy. 2293

History.—The specimen is from a middle-aged female, who died suddenly while engaged in her usual household duties.

3289. The heart of a sow, laid open. Situate in the ventricular septum close to the apex is a hydatid cyst. Part of the anterior wall of the heart has been removed to expose the cyst and a watch-glass inserted, under this the parasitic cyst is seen. The cyst bulges into the left ventricle, having in great measure absorbed the overlying muscular tissue; attached to the cyst-wall near its most prominent part is a slender cord of the columnæ carneæ. 2215

3290. The left ventricle of a heart, showing four hydatid cysts in its interior. The largest is situate at the apex; close to this is a very small one: above it and near the septum is a third cyst, and a fourth is situate between the wall and one of the musculi papillares. The cysts have not encroached upon the muscular tissue, but project into the cavity of the ventricle. Suspended separately is a small round cyst, which has been bisected; this probably came from the interior of the larger one. The walls of the ventricle are much hypertrophied, measuring at the thickest part near the apex one inch in thickness.

3291. Part of a heart showing a large polypus projecting into the left auricle. The pedicle is rounded, and the polypus has the appearance of being double, a deep groove dividing it on each aspect, and the mass being bifid at the free end. The pedicle is attached to the septum auriculorum. The polyp is smooth on the surface, but not encapsuled; the cut surface has a fatty myxomatous appearance, it is soft and spongy. 4847

Microscopic Examination.—The tumour is composed of a delicate stroma of fine connective tissue, such as is seen in myxomata. There are no cellular elements present, but the condition of the specimen is such that accurate microscopic examination is almost impossible.

3292. A piece of the right ventricle with the origin of the pulmonary artery. The layers of the central cusp of the semilunar valve have been separated by a small serous cyst about the size of a pea. This cusp and the one on the right of the observer are united by their opposed margins. 2268

For Wax Models of Sarcoma of the Heart, see page 145, *No.* 3606.

SERIES XLVIII.—ENDOCARDITIS. VALVULAR DISEASE OF THE HEART.

Inflammation of the endocardium is due in the majority of cases to rheumatic fever; it may also be met with in chorea, scarlet fever, typhoid fever, or any infective process; and the chronic form may be caused by Bright's disease, syphilis, and chronic alcoholic poisoning.

The affection is never general, but confines itself to certain parts of the heart. Thus it is especially seen in those parts most subjected to strain. For this reason the disease is almost always confined to the left ventricle, and to the mitral rather than the aortic valves. The right side of the heart may become secondarily affected in consequence of the additional strain thrown upon it by the difficulty offered to the pulmonic circulation in diseases of the left side of the heart.

In fœtal life, however, right-sided endocarditis is most commonly seen, since the strain is greater on account of the varying tension of the blood in the vessels. Intra-uterine endocarditis is especially liable, by causing more or less obstruction to the circulation, to lead to an arrest of development of the heart (*vide* Malformations of of the Heart, p. 60).

The mitral valves are more usually affected than the aortic, because greater strain is brought to bear on them; they are more forcibly closed by the strongly contracting ventricle than are the aortic by the recoil of the vessel-wall, and consequent backward flow of the blood. In addition, the mitral valve is acted upon by the chordæ tendineæ and musculi papillares.

As strain is a potent factor in determining the situation of endocardial inflammation, those parts of the valves which come into contact during closure are the first to show evidences of the disease.

The parts of contact become 'beaded' owing to cellular exudation into their substance (No. 3295). The small elevations thus formed soon become coated with a film of fibrine deposited by the blood (Nos. 3295 and 3311). This increases in size until the outline of the valve may be almost completely obliterated by these so-called vegetations (Nos. 3303 and 3320).

Should the inflammatory exudation degenerate and soften from imperfect nutrition, the valve will become weakened, and that side of it which is least affected will tend to bulge owing to the pressure of the blood-current. This is known as Valvular Aneurysm. In the aortic valves the aneurysm will project towards the ventricle (No. 3321); but in the mitral towards the auricle, *i.e.* in the direction of greatest pressure (No. 3321). Later on the valve may be perforated by giving way of the part forming the wall of the aneurysm; and in some cases the valves become more or less completely destroyed (No. 3314). In the case of the aortic valves they may become more or less retroverted, since they are not held by any chordæ tendineæ (No. 3321).

The chordæ tendineæ and musculi papillares share in the inflammatory process. The former may be softened by inflammation and give way under the strain to which they are subjected.

Rupture of the chordæ tendineæ (No. 3300) may occur in the course of heart disease, associated with dilatation of the left ventricle, since in such a condition there is very considerable strain put upon the chordæ tendineæ, which are frequently themselves softened by disease. The ruptured chordæ tend to curl up and become coated with fibrine if the patient survive. More commonly they become shortened, thickened, and tougher than natural, and may become united to one another (No. 3308). The cusps of the various valves may also unite along their adjacent margins (Nos. 3308 and 3328). The musculi papillares at their tips, the point of greatest strain, become fibroid and opaque (No. 3308).

Endocarditis may be set up in the neighbourhood of the diseased valves by the constant friction caused by the fibrinous vegetations.

In more chronic cases, the changes are more or less identical with those seen in atheroma. The progress of the disease is insidious, and marked by gradual contraction and puckering of the affected valves, which are thickened and rendered rigid by calcification of the inflammatory products (Nos. 3328 and 3330).

The fibrinous vegetations described as occurring on the valves may be detached and give rise to embolism.

Any obstruction to the free circulation of the blood through the heart will necessarily induce compensatory hypertrophy and dilatation of the cavity more especially concerned; but after some time the whole heart may become similarly affected. Dilatation of the ventricles of the heart necessarily leads to incompetence of the auriculo-ventricular valves, and throws additional work on the auricles; thus ultimately leading to venous engorgement (*vide* Hypertrophy and Dilatation, pp. 65, 66).

Acute Ulcerative Endocarditis (No. 3324) is a much more rare condition than the chronic form. It is of an infective nature and frequently accompanied by pyæmic manifestations. The changes induced in the endocardium and valves are much the same as those seen in chronic cases, differing chiefly in the rapidity with which they occur, and the fact that micro-organisms are present in the exudation and vegetations and that these vegetations are bushy and exuberant.

As the process is a more rapid one, the vegetations are less adherent and therefore more likely to become detached and give rise to embolism. The emboli act not only mechanically, but are highly infective. This infective process is more prone to occur on valves which are already the seat of lesions. The infective agent is probably the Staphylococcus pyogenes aureus and albus (see works on Experimental Pathology).

Specimens of Disease of the Mitral Valve.

The cusps of the mitral valve may become united together so that the valve forms a septum across the auriculo-ventricular opening. This septum is contracted, puckered, thickened, and often calcified (No. 3310). The auriculo-ventricular opening is necessarily much contracted, and is frequently seen as a mere slit, the so-called " button-hole " mitral (No. 3310).

The chordæ tendineæ are shortened and thickened, and may in some cases unite with one another (No. 3308). Owing to the shortening, they tend to pull down the cusps of the valve towards the ventricle, and so render it funnel-shaped (No. 3305).

Disease at the mitral orifice is associated with hypertrophy and dilatation of the left auricle and consequent congestion of the pulmonary veins.

3295. The heart of a girl aged twenty who died of acute rheumatism. The pericardium has been inflamed and is coated with a layer of coagulated lymph. All the valves, but especially those on the left side, show evidence of disease. At the free margins of the aortic valves on their ventricular aspect is a layer of lymph, which can be peeled off the surface. The margins of the mitral valve are beaded by inflammatory exudation, which extends in some cases along the chordæ tendineæ. The valves are thickened and opaque.

Similar changes, though less marked, are seen in the pulmonary and tricuspid valves.
4314

3296. A heart laid open to show the valves at the mitral orifice. The cusps are much thickened and opaque, especially at the margins opposite the attachment of the chordæ tendineæ. The thickening is due to effusion into the substance of the valve. The endocardium on the surface is smooth and polished. The chordæ tendineæ are rather thicker than natural.

The wall of the ventricle is hypertrophied. The endocardium of the auricle is thickened, opaque and wrinkled from chronic inflammation. 586

3297. The left auriculo-ventricular portion of the heart, showing the results of chronic endocarditis. The inner surface of the auricle is opaque, wrinkled, and partially coated with fibrin. The endocardium is thickened. The cusps of the mitral valve are contracted, shortened, and rendered incompetent; the free margins are thickened and the seat of fibrinous deposits. The auriculo-ventricular orifice measures 1½ by about 1¼ inch. 2245

3298. A part of the left auricle with the cusps of the mitral valve. The inner surface of the auricle and the auricular surface of the mitral valve are roughened by a deposit of fibrin as a result of endocarditis. The endocardium is thickened and roughened.

Suspended separately is a small aneurysm connected with one of the cerebral arteries. 5545

3299. A portion of the left side of the heart. The portions of the aortic valves seen are normal. The left ventricle is hypertrophied, and one of the musculi papillares is considerably larger than natural. Many of the chordæ tendineæ have been ruptured and are hanging loose into the cavity of the ventricle. The free margins of the cusps of the mitral valve are the seat of extensive fibrinous vegetations, especially at those parts where the chordæ tendineæ have been ruptured. The auricular aspect of the valve is also affected, although to a less degree, and similar fibrinous deposits are seen on the posterior surface of the auricle, the endocardium of which is thickened and opaque from chronic inflammation.

Lime-salts have been deposited in the vegetations, although not very abundantly. 5337

History.—Caroline B., æt. 18, was admitted into Univ. Coll. Hospital under Dr. Wilson Fox, March 1st, 1869. Two years and a half ago she had rheumatic fever, followed by chorea, one year after this another attack of chorea. She was admitted with signs of phthisis. There was an apex systolic murmur, prolonged, rough, and loud. The second sound was scarcely audible. In April the right foot became gangrenous and she died May 25th, 1869. *Vide* Dr. Wilson Fox's *Case-book* 1869, "Caroline Bateman."

3300. A heart, the left ventricle and auricle having been laid open to show rupture of the chordæ tendineæ of one of the cusps of the mitral valve. The ruptured chordæ are those attached to one of the musculi papillares only, and the other chordæ attached to the same papillary muscle, but going to the other valve, are not torn. They have given way about the middle of their length; they are not abnormally thin. The muscular substance of the ventricle is hypertrophied. 6230

3301. A heart, the left auricle and ventricle have been laid open. Close to the base of the anterior cusp of the mitral valve is a large polypoid mass of fibrinous exudation, dense in structure, and impregnated with lime-salts. A piece of the valve has been destroyed at this part, and the chordæ tendineæ ruptured and coated with fibrine. The margin of the valve is thickened, but has no fibrin adherent to it.

The mass mentioned projects on the auricular aspect of the valve, so that it would produce impediment to the flow of blood into the ventricle. 3667

3302. A portion of the left side of a heart with the mitral orifice. The anterior cusp of the mitral valve presents at its attachment a ragged opening about ½ inch in diameter. The margins of this are beset by fibrinous masses. The margins of the valves are thickened. The apices of the columnæ carneæ and the chordæ tendineæ are thickened and opaque.

The aortic valves do not present any marked evidence of disease. 5046

3303. Part of the left ventricle of a heart with the mitral valve. The auriculo-ventricular orifice is almost completely blocked by a large mass of dense fibrine, which is attached to the auricular aspect of the valve, and also mats together the chordæ tendineæ of one cusp of the valve. The ventricle is hypertrophied, the wall measuring over ½ inch in thickness. In the MS. Catalogue it is stated that the fibrinous material also extended to the aortic valves and into the aorta. 1615

3304. Part of the left ventricle with the auriculo-ventricular orifice. The mitral orifice is narrowed and the valves rendered incompetent by thickening and contraction as the result of chronic endocarditis. The posterior or smaller cusp is very much contracted; the anterior one is dense and fibro-cartilaginous to the feel. During life there was a double murmur. The muscular tissue is increased in amount. 2374

3305. Part of a heart showing mitral stenosis. The walls are thickened by hypertrophy of the muscular tissue. The cusps of the mitral valve are opaque, dense, and resistant. The chordæ tendineæ are thickened and shortened. The cusps of the valve have united, and the orifice is contracted, being oval in shape and measuring about ½ inch in the long diameter. At one part on the auricular aspect is a deposit of fibrine. The margins of the two aortic valves which have been preserved are thickened. The mitral valves are pulled towards the ventricle owing to the shortening of the chordæ tendineæ; this gives the valve a funnel-shaped appearance.

The specimen is from an old woman. The left auricle was hypertrophied and dilated. 606

3306. The left auriculo-ventricular portion of a heart showing constriction of the orifice from inflammatory thickening and contraction of the mitral valves. The valves are thickened, opaque and wrinkled from contraction, and tend to turn up into the auricle. If the specimen is held up to the light it will be seen that the attached part of the valve is much less affected than the free part, and that it is still translucent. The chordæ tendineæ are shortened and thickened, and at one part the valve and musculi papillares are continuous. The orifice is much contracted by adhesion of the cusps to each other; it is oval in shape, measuring ⅗ inch by rather more than ⅕: its margins are smooth and rounded. On the auricular aspect of the valve, where the cusps are united and opposite the attachment of one of the musculi papillares, is a rounded ulcer with thickened margins and base partially covered with fibrine. 2301

3307. A specimen showing the mitral and aortic valves, with the commencement of the aorta. The cusps of the mitral valve are thickened, indurated and rigid, producing stenosis; the chordæ tendineæ are shortened and flattened. The aortic valves are similarly affected, the thickening being very marked at the lunula and free borders. The aorta is atheromatous. 605

3307 A. Part of a heart showing disease at the mitral and tricuspid orifices without any hypertrophy or dilatation. The auriculo-ventricular valves are thickened and rigid, the changes being much more advanced at the mitral orifice, which is crescentic in shape. The aortic valve which has been preserved is very thick and of fibro-cartilaginous density. 1868

3308. Part of a heart showing an extreme degree of mitral stenosis. The mitral valve is thickened, dense and resistant. The chordæ tendineæ are matted together, and only one or two can be distinctly recognized. The musculi papillares are also chronically inflamed at their free ends and rendered opaque and dense. A piece of glass passed through the mitral orifice indicates its size. The auricular walls are thicker than natural. The aortic valves are slightly thickened. 6473

History.—Fanny Bishop, æt. 33, died in University College Hospital in April 1889. She had scarlet fever when ten years old, and acute rheumatism when twenty. Cardiac symptoms had been present for three years, the prominent ones being palpitation, syncope and œdema of the legs. Auscultation showed a double basic and a diastolic apex murmur. The urine contained a trace of albumen, and the liver was enlarged. The patient died in a fit (? uræmic), the temperature being 105°–6°. No lesions were found in the brain at the post-mortem.

3309. A heart showing disease of the aortic and mitral valves. The aortic valves, close to their free margins on the ventricular aspect, are covered with a small amount of fibrinous material. The cusps of the mitral valve are much thickened and calcareous; they are united, producing great obstruction; the orifice is a slit, measuring about $\frac{1}{2}$ inch by $\frac{1}{6}$ inch. The endocardium below the aortic valves and covering the musculi papillares, especially at their tips, is thickened and opaque from chronic inflammation. The chordæ tendineæ are thickened and shortened. The margins of the tricuspid valve are somewhat thickened and, on the auricular aspect, covered here and there with a small quantity of fibrine. The left auricle is considerably dilated and its walls hypertrophied. 5542

3310. A heart showing mitral constriction. The cusps of the mitral valve are rigid and hard, being extensively infiltrated with lime-salts. On the auricular aspect the endothelium has been removed, exposing the calcareous material. The space left between the cusps is slit-like and very narrow. The aortic valves are thickened and the vessel is slightly atheromatous. 5334

History.—Edward Gardiner, æt. 35, was admitted into the Hospital under the care of Sir W. Jenner on April 19th, 1868. His father died at the age of forty, from rheumatic fever, and his mother, æt. 70, from "heart disease and dropsy." The patient had rheumatic fever when ten years old. For many years he had drank a pint of gin daily. About eighteen months before admission there was dyspnœa and enlargement of the abdomen. On admission there was a soft-blowing systolic apex-murmur conducted into the axilla. There was œdema of the legs and albumen in the urine. The patient improved and went to Eastbourne, but was re-admitted and died on January 5th, 1869. *Vide* Sir W. Jenner's *Case-books*, vols. ix. and x.

Specimens of Disease of the Aortic Valves.

The cusps of the aortic valve may unite along their adjacent margins and present a funnel-shaped appearance with the apex towards the aorta (No. 3328). As they are not held in place by chordæ tendineæ, they may become retroverted into the ventricles (No. 3321).

Vegetations are most abundant on the ventricular aspect and along the free margin near the corpus Arantii (Nos. 3312 and 3319).

The valves may be perforated (No. 3316), or ruptured (No. 3314).

3311. A specimen showing very early vegetations on the cusps of the aortic valve. The minute masses of lymph are seen just opposite the lunula on the ventricular aspect of the valves. 6462

History.—The patient was under the care of Dr. Ringer, and died early in March, 1889. She had rheumatic fever with pneumonia, and at one time it was thought typhoid fever was also present. At the post-mortem examination an abscess cavity with sloughy walls was found in the centre of the right lung, which was inflamed.

3312. The origin of the aorta with the sigmoid valves. On the ventricular aspect of one of the cusps is a large fibrinous vegetation; the other valves are thickened, especially at their free margins. The aorta is atheromatous. The mouth of one of the coronary arteries is dilated. 3754

History.—The specimen is from a man aged 70, who died of acute pericarditis. For twenty or thirty years he had been troubled with palpitation and præcordial pain. There was a double basic murmur.

3313. A portion of the left ventricle and origin of the aorta. Two of the sigmoid valves have been extensively destroyed by ulceration, and are the seat of a deposit of fibrine. The loss of substance in the valves has not affected the free margin, so that they still retain their crescentic form, but the attached portion is thickened and perforated. The condition is more advanced in one valve. The sinuses of Valsalva and the mouths of the coronary arteries are dilated. The aorta itself is normal, but there are two small yellowish atheromatous patches close to the margin of the sinuses. The portion of the third valve, seen in the specimen, is healthy. 1467

3314. A heart, the left ventricle and aorta being laid open. The ventricle is dilated and its walls hypertrophied. The inner surface of the aorta is thickened, opaque, and mottled from chronic endarteritis. Two of the aortic valves have been partly destroyed by inflammation, so that they could no longer perform their function. The third valve is comparatively healthy. The mitral valve is normal. The condition of the valves would have permitted regurgitation of blood into the ventricles. 4005

3315. A portion of a heart with the cavities laid open. The aortic valves are thickened by chronic inflammation; this is specially noticeable at the free margins. The mouths of the coronary arteries are slightly atheromatous. The left ventricle is considerably dilated; the columnæ carneæ are thinned. The musculi papillares and chordæ tendineæ are thickened, very resistant, and of an opaque white colour, from chronic inflammation. These changes are less marked where the musculi papillares spring from the wall of the ventricle. The two muscular bundles are united, and the mitral valves are almost unrecognizable, being thickened and contracted from inflammation. The mitral orifice is much constricted and is elongated, measuring $\frac{3}{4}$ by $\frac{1}{4}$ inch. The left auricle is dilated, and its endocardium thickened, opaque, and wrinkled by inflammation. 2144

3316. A portion of a heart showing disease of the aortic valves. The central valve shows a loss of substance about its middle. It is thickened, and the margins of the perforation are coated with fibrine on the ventricular aspect. The sinus of Valsalva is dilated. The lining membrane of the aorta, especially at the margins of the sinus of Valsalva and round the orifices of the coronary arteries, is atheromatous, thickened, and of an opaque white colour from effusion underneath it. The walls of the left ventricle are very much hypertrophied, measuring in one part an inch in thickness. The endocardium of the auricle and ventricle shows evidence of chronic inflammation. 5595

3317. A portion of a heart, with the commencement of the aorta and pulmonary artery, which has been laid open. The pulmonary valves are healthy. There are only two sigmoid valves to the aorta. One of them was accidentally torn at the post-mortem examination. They are both thickened and opaque from chronic inflammation, and are the seat of a dense fibrinous deposit, which is partly calcified; the condition is much more marked on the intact valve, and is principally noticed on its cardiac side. The sinuses of Valsalva are dilated. The two coronary arteries are situate behind the untorn valve. The orifices are dilated. 2067

History.—The specimen was taken from the body of a man, æt. 30. It is stated in the MS. Catalogue that there were no signs of the condition before death.

3318. The commencement of the aorta and pulmonary artery, laid open. The ventricular surface of the margins of the aortic valves is the seat of masses of calcified fibrinous material. This is only seen in the centre of the valve, the sides being free. The orifices of the coronary arteries are atheromatous, and a similar material is deposited round them; a piece of blue glass has been passed through one of the vessels. The pulmonary valves are healthy. It is noticeable that the parts most subjected to strain are those specially affected. 2375

3319. A part of the wall of the left ventricle, with the commencement of the aorta and one cusp of the mitral valve. The sigmoid valves are the seat of dense fibrinous masses, in which lime-salts have been deposited, and the valves thus rendered hard and rigid. One of them has been torn away from its attachment (this was probably post-mortem). The ventricular surface of the valves is more affected than the aortic. Atheromatous patches are seen in, and close to, the sinuses of Valsalva. One of these patches forms a rounded prominence on the interior of the vessel: it has been laid open, and is seen to consist of dense fibrous tissue. Pieces of glass have been passed into the coronary arteries. The free margin of the mitral cusp is beaded and thickened, and on its ventricular aspect a few shreds of fibrin have been deposited. The cavity of the ventricle was evidently dilated and the wall hypertrophied; it measures in its thickest part $\frac{7}{8}$ inch. 2115

3320. A portion of the left ventricle and aorta. The ventricle is dilated and its walls hypertrophied. The aortic valves have lost their natural shape, and are much increased in size and thickness by a deposit on their surfaces of fibrinous material, containing lime-salts. This affects both surfaces, and narrows the sinus of Valsalva. The aorta is dilated and at one point is pouched to form an aneurysm; its lining is for the most part smooth and healthy, but presents a few small, white, atheromatous patches slightly raised above the surface. The valves are quite rigid, and produced marked aortic stenosis.

3321. A portion of a heart with the commencement of the aorta. The aortic valves are the seat of an extensive deposit of fibrine; the opposed margins of two of the valves are adherent, and so appear to form one large cusp. The sinus of Valsalva, behind the central cusp, is dilated. Close to the free margin, the anterior cusp of the mitral valve is the seat of a small aneurysmal dilatation, the orifice being on the ventricular aspect. The valve is thickened and opaque, and its margins beaded. One cusp of the aortic valve is bulged towards the ventricle. 4166

3322. Part of a hypertrophied heart with the aortic valves, two of which are united. The aorta is atheromatous; the large raised patches project into the lumen of the vessel, just above the valves. These patches are for the most part smooth, but over the calcareous areas the endothelium has been removed. The valves are thickened, especially at their free margins; one of the patches mentioned involves the end of one of the valves, which is here very rigid and extensively calcified. On the ventricular surface is a small amount of fibrinous deposit. 2265

3323. Part of a heart showing extensive disease of the aortic and mitral valves. The ventricular surface of the cusp of the mitral valve is covered with fibrinous vegetations, but the free margins are not affected. Similar deposits of fibrin are seen on the aortic valves, especially on the ventricular surface. The valve nearest the mitral is bulged towards the ventricle, forming a valvular aneurysm. The ventricular walls are hypertrophied. Atheromatous changes are seen round the mouth of one of the coronary arteries. 4838

3324. The heart of a man who died of ulcerative endocarditis and acute pericarditis. The outer surface is coated with inflammatory lymph. The walls of the left ventricle are enormously hypertrophied. The aortic valves have lost their normal outline and appearances, being covered with large masses of fibrine of leathery consistence. The disease has spread to the neighbouring cusp of the mitral valve near its attachment, and has extended through its substance, producing roughening of its auricular aspect. 5449

3325. A specimen showing disease of the aortic valves. The valves are covered with fibrinous vegetations, which also extend to the ventricular surface of the adjacent cusp of the mitral valve. The two sigmoid valves on the right of the observer have united for some distance, but at one part there is a small space between them. The sinus of Valsalva behind the most diseased valve is dilated to form a small aneurysm. The wall of the ventricle is hypertrophied. 6445

The specimen was from a man aged 20. *Vide* Dr. Bastian's *Case-book*, Males, 1889.

3326. Part of the left ventricle of a heart with the origin of the aorta. There are only two semilunar valves; one of them has been divided. Glass rods have been passed through the mouths of the coronary arteries. The valves are much thickened by chronic inflammation and are infiltrated with lime-salts. There is a small aneurysmal dilation of the aorta behind one of the valves; the dilated part is filled with blood-clot infiltrated with lime-salts.

The part of the ventricular septum preserved in the specimen is much hypertrophied. 3666

3327. Part of a heart showing extreme calcification of the aortic valves. The valves are throughout their whole extent infiltrated with lime-salts. One of the valves is bulged towards the aorta, so that the corresponding sinus of Valsalva is almost obliterated; on the ventricular aspect of this valve the endothelium has been removed, so that the calcareous plates were in direct contact with the blood-current. The anterior cusp of the mitral valve is, at its base, infiltrated with calcareous matter continuous with that in the neighbouring aortic valve. Patches of atheroma are seen in the aorta. The left ventricle is greatly hypertrophied, measuring over an inch in thickness at the thickest part. 3861

History.—Robert Inglis, æt. 49, had had two attacks of rheumatic fever. For the last two years of his life he had had cough, dyspnœa, and occasional pain in the chest. These symptoms increased, and for the last two months he had not been able to do any work. There was a double basic murmur. He died suddenly after a severe attack of dyspnœa and pain in the chest lasting for two hours.

Post-mortem Examination.—There were twenty ounces of serous fluid in the right pleural cavity and thirty ounces in the left. Heart weighed twenty-eight ounces. Wall of right ventricle, $1\frac{1}{8}$ inch thick, about $\frac{1}{6}$ inch at apex.

3328. Part of the left ventricle with the commencement of the aorta. The aortic valves are very much thickened from chronic inflammation, and are completely calcified, so that they form a perfectly rigid septum across the vessel. They are blended together, except in the middle two fourths, where there is a slit measuring $\frac{5}{8}$ inch by $\frac{1}{10}$ for the passage of the blood. The calcareous matter is deposited in irregular nodules and is beneath the lining membrane, but in some places this has been worn away. The sinuses of Valsalva have been encroached upon by the calcareous masses, so that the valves are more convex than concave on their aortic aspects. Patches of atheroma are seen in the aorta. The coronary arteries are much dilated. 3556

3329. Part of a heart showing extensive calcification of the aortic valves, producing stenosis. The valves are extremely hard and unyielding; they have a granular, somewhat crystalline, appearance. The muscular wall of the left ventricle is hypertrophied. 2238

3330. A heart with the commencement of the aorta, which has been laid open. The vessel is dilated, but its inner wall is smooth and healthy. The aortic valves are extremely diseased, and two of them are fused. They are thickened and calcified, so that their surface is irregular and gnarled in appearance, and they are rigid and quite unyielding. There is a mere slit left for the passage of the blood. The left ventricle is much hypertrophied, its wall measuring in some parts $1\frac{1}{4}$ inch in thickness. The mitral valve is healthy.

3331. A specimen of miliary tubercles on the aortic valves. There are four instead of three valves, one of them is imperfectly developed, being more extensively adherent to the aorta than usual. On very careful examination minute round tubercles can be seen studding the valves. 6023

History.—The specimen is from a young woman who died of tubercular meningitis, complicating tubercular disease of the lungs and intestines. She had suffered for a long time from sacro-iliac disease on the right side.

3332. A piece of the left ventricle of a heart with the origin of the aorta. Two of the aortic valves are united for some distance, and where they are joined is a rounded dense mass of inflammatory tissue. This is quite localized, but the valves are thickened throughout. 6431

History.—The specimen is from a patient who died of syphilitic cirrhosis of the lung. It is probable that the mass seen in the aortic valve is a gumma.

SPECIMENS OF DISEASE OF THE TRICUSPID AND PULMONARY VALVES.

The changes met with in these valves are precisely similar to those described as occurring on the left side of the heart; they are, however, not so well marked, and much more rarely met with (Nos. 3333 to 3336).

See also Malformations of the Heart, p. 60.

3333. The heart of a terrier bitch seven years old. The tricuspid and mitral valves are, in the centre, very much thickened at the free edges. The thickened parts are nodular and opaque, and of fibro-cartilaginous hardness. For two years before the animal died, she had been subject to fainting fits, becoming suddenly unconscious, especially when excited. There was a crowing systolic apex-murmur, scarcely audible at the base but conducted towards the left side of the chest.

At the post-mortem the liver was found to be enormously engorged with blood, so that it caused considerable distension of the abdomen. 4192

3334. A heart with the great vessels. The subpericardial fat is increased in amount. Adherent to the posterior part of the left ventricle, near the apex, is a piece of thickened pericardium. The cavity of the right auricle is dilated. The tricuspid orifice is narrowed, and the cusps of the valve adherent to one another, so as to form a ring; the cusps nearest the septum are adherent to it. The left auricle is dilated, and ante-mortem blood-clot is firmly adherent to some parts of the wall. The mitral orifice is much constricted, only admitting the finger. The cusps of the valve are very thick and resistant, and the chordæ tendineæ thickened and shortened. The pulmonary artery has been laid open, the valves are healthy. The aortic valves are bulged towards the ventricle, perfectly rigid, and covered with small specks of fibrine; their adjacent sides are adherent. The aorta is slightly atheromatous. 5745

History.—S. D., a widow, æt. 49, was admitted into the hospital, under the care of Dr. Wilson Fox, on December 16th, 1881. She had acute rheumatism in 1856, and since then had been subject to rheumatism, but the attacks had never been severe. The present illness dated from March, 1881, when the patient caught cold, which was followed by dyspnœa, palpitation, and œdema. On admission these symptoms were marked. The pulse was 48, small, and irregular. There was a double apex-murmur, and a basic one with the first sound of the heart. The patient gradually became worse, the dyspnœa being constant and severe, and the œdema very troublesome. Before death, cough and slight hæmoptysis were present. She died on January 25th, 1882.

At the *post-mortem* the lungs were found congested and studded with small areas of apoplexy. In the left division of the pulmonary artery was a thrombus, adherent to the wall, and extending into some of the arterial branches of the upper and lower lobes. This clot extended as far as the pulmonary valves, but did not affect the right division of the vessel.

3335. A heart showing congenital stenosis of the pulmonary valves, and consequent great hypertrophy of the right ventricle. The three cusps of the pulmonary valve are united, so that there is only an aperture measuring $\frac{3}{16}$ inch in diameter. The valve is also thickened. The thickest part of the right ventricle measures an inch.
The specimen is from a young woman, aged 20. 2237

3336. A heart with the origin of the aorta and pulmonary artery. The cavity of the left ventricle is dilated. The aortic valves are healthy, but the aorta is extensively atheromatous; its surface is irregular and rough from calcification of the inflammatory material. In some parts, the calcareous laminæ are still covered with endothelium, in others they are quite bare and project into the lumen of the vessel. White patches, due to endocarditis, are seen on the columnæ carneæ and musculi papillares of the ventricle. In the pulmonary artery are numerous rounded, raised, inflammatory patches of a dead white colour; five such patches are seen behind one of the valves, and one behind a second valve. One small patch is also present under the endocardium just below the valve. The pulmonary valves themselves are healthy.

SERIES XLIX.—DISEASES OF THE LUNGS AND PLEURÆ.

PLEURITIS.—EMPYEMA.

Inflammation of the pleura, like that of any other serous membrane, may be primary or secondary. Primary pleurisy is usually attributed to the effects of cold, and probably begins in the parietal layer. Secondary inflammation is by far the most common form, and is dependent upon some pathological lesion of neighbouring parts, more especially the lungs. In some cases it may spread from the abdominal cavity through the lymph spaces in the diaphragm. Lastly, pleurisy is met with in Bright's disease and any infective process. Acute and chronic pleurisy merge insensibly one into the other.

Inflammation of the pleura may be general or circumscibed, depending in great measure upon the cause of the condition.

In the early stage of the process the vessels are intensely congested and there may be minute extravasations, giving the membrane a spotted appearance. The pleural surface loses its polished shining appearance, becoming dull, slightly roughened and coated with a fine film of lymph (Nos. 3341 and 3346).

The epithelioid cells proliferate, degenerate and desquamate. The serous and subserous tissues are swollen and sodden. The quantity of lymph poured out soon forms a more or less thick layer covering the inflamed pleura. It is yellowish or reddish-yellow in colour, and may be quite smooth or honeycombed on the surface.

At the same time there is some fluid exudation into the pleural cavity. The fluid is usually sero-fibrinous and is often turbid from admixture of cells and flakes of fibrine. It may be very scanty (Dry Pleurisy) or may be effused in large quantity. In some cases the fluid is mixed with blood, and this is especially liable to occur in any condition of the system in which hæmorrhages are common. When suppuration occurs the condition is known as Empyema.

The fluid exudation in pleurisy or empyema may be quite circumscribed in consequence of adhesions having formed in former attacks of inflammation. When large in quantity the fluid exerts pressure on the lung and thoracic and abdominal viscera. At first the lung will simply float on the fluid, but as this increases in amount the air is gradually squeezed out and the lung is compressed, usually from below upwards, against the spine and the mediastinum (Nos. 3347 and 3348). If the lung is subjected to considerable pressure for any length of time it will not crepitate under the fingers but becomes carnified.

Simple pleurisy without suppuration may end in resolution, the fluid becoming first absorbed and ultimately the lymph, after undergoing fatty degeneration. More usually, however, the lymph organizes and causes adhesions between the two pleural surfaces (Nos. 3342 and 3343).

These adhesions may be so extensive as to completely obliterate the sac (No. 3343). The new tissue formed in the process of organization may be of great thickness and of fibro-cartilaginous density (No. 3347). In such cases its blood-vessels are scanty and lime-salts may be deposited in the thickened pleura (No. 3350).

When the fluid of a pleurisy or empyema has been removed, the lung, if it has not been pressed upon for too long a time, will again expand; but if it has been so damaged that it cannot expand, or only to a slight extent, the chest-wall frequently falls in, and the thoracic organs are drawn over to the diseased side in order to fill up the cavity (No. 3346).

Empyema is the term applied to a collection of pus in the pleural cavity. It is probable that most, if not all, empyemas originate as simple acute pleurisy, the formation of pus occurring after a time. Empyema is very common in children, especially after one of the acute specifics (No. 3346). Sooner or later the pus escapes. In many cases the abscess burrows into the lung-tissue and the pus is expectorated (No. 3348); in rare instances this may lead to cure. If an empyema bursts through the thoracic wall, it usually points anteriorly between the costal cartilages, where the muscular stratum is thinnest. The pus may also perforate the diaphragm and escape into the general cavity of the peritoneum, or it may open into the mediastinum, the opposite pleural sac, or into the pericardium. In long-standing cases of empyema the pleura becomes enormously thickened and dense, and the ribs much enlarged and altered in shape (Surgical Catalogue, Specimen No. 1), so that the intercostal spaces are considerably narrowed.

Should an empyema burst through the lung, air may find its way into the pleural sac (pyo-pneumo-thorax), and then the pus becomes extremely fœtid from decomposition. In case of empyema it is always necessary to remove a portion of one rib in order to secure efficient drainage (No. 3346); in long-standing cases in adults whose chest-walls are rigid it is often necessary to resect portions of several ribs and to cut away the thickened tissues underlying them in order to allow of a sufficient amount of collapse of the chest-wall to close the abscess-cavity.

3340. Part of the right lung of a child, aged fifteen months, who died of acute pleurisy. The pleura costalis has been preserved. The opposed pleural surfaces are coated with lymph, but are not adherent. The lymph is also seen on the pleural surface of the diaphragm. 1381

3341. A piece of lung with the visceral pleura, which is coated with flakes of lymph consequent on acute pleurisy. The lymph is of a yellowish colour, and can be easily peeled from the surface, the underlying pleura being more opaque than natural. The lung-substance is not diseased. 552

3342. Part of a lung with the visceral pleura, which has been injected. The pleura is covered with a fibrous membrane, the result of previous inflammation; this has been separated for some distance. Numerous minute vessels can be distinctly traced passing into the new tissue. 2205

3343. Portions of two ribs and their cartilages with the pleura and piece of the lung, showing the effects of old pleurisy. The visceral and parietal layers of the serous membrane have become adherent, so that the pleural sac is obliterated and the lung adherent to the parietes. At one part the two layers still remain distinct, being only united by round cord-like adhesions. 1590

3344. A piece of the pleura costalis, which is considerably thickened by repeated attacks of inflammation. The inner surface is covered with a layer of lymph, which can be readily separated from it. 554

3345. A piece of the diaphragm with pigmented adhesions of the pleura.

3346. Part of the thorax of a child from a case of empyema. Portions of the fourth to the seventh ribs have been removed in order to show the cavity of the empyema. The lung is adherent at the apex and along part of the outer surface. The pleura is covered with lymph. The lung is compressed against the spine. The heart is displaced to the left. The right pleura is covered with inflammatory exudation; this is most marked on the pleural aspect of the diaphragm. The intercostal spaces are very narrow, and it is evident that the empyema could not have been properly drained unless a piece of rib had been removed. 5688

History.—Richard Connelly, æt. 3, was admitted to the hospital under the care of Dr. Wilson Fox on November 10th, 1881. He had had scarlet fever in August, but desquamation had not ceased until November.

On admission the child was extremely weak, and there was dropsy of the lower extremities and of the hands. The breathing was hurried and shallow, and the breath-sounds were weak. Owing to the feeble condition of the child, no thorough examination was attempted. The temperature on admission was 98°·6, but became subnormal before death, which took place on November 12th.

At the *post-mortem examination* about three ounces of pus were found in the upper part of the left pleural cavity; and about one ounce was let out from the cavity seen in the specimen. There was a slight excess of fluid in the abdomen and the intestines were matted together by flakes of lymph, but this was only noticed at the upper part of the abdomen.

Vide Dr. Wilson Fox's *Case-book*, Males, 1881, p. 184.

3347. Part of a lung with the visceral and parietal layers of the pleura, from a case of empyema. The lung is compressed. The layers of the pleura, especially the costal, are considerably thickened by chronic inflammation so that they do not collapse. The pleura is of fibro-cartilaginous density, and the rib-marks are distinct on the outer surface of the parietal layer. The inner surface of the abscess sac is smooth. The lung was very much compressed against the spine and was not more than an inch in thickness. The condition had lasted for several months. The pleural sac contained sero-purulent fluid. 2066

3348. The left lung with part of the pericardium, from a case of empyema. The pleura is thickened and covered with tough organized lymph. The pericardium and pleura are adherent. The cut surface of the lung shows dilatation of the bronchi and compression of the lung-substance. A small tubercular cavity is seen at the extreme apex; and lower down are areas of tubercular matter, which have not yet undergone marked degeneration. At the apex of the lower lobe is a similar patch. On the outer surface of the lung is a small patch uncovered by lymph and slightly depressed below the surface. It is marked by two bristles, and probably represents the opening by which the pus escaped into the lung; but no mention is made of this in the MS. Catalogue. 1863

3349. A portion of lung with the pleural sac. The two layers of the pleura are considerably thickened by chronic inflammation, but are not adherent. The pleural cavity contained fluid which compressed the lung.

A section of the lung has been made at one part; the cut surface is traversed by dilated bronchi, and is studded with yellowish nodules, probably tuberculous. 2627

3350. Masses of lymph and inflammatory material which were stripped off the wall of an empyema. They are leathery in consistence and in some places are calcified. The specimen serves to illustrate the advantage of making a free opening, by removal of a portion of rib, in cases of empyema. 6377

History.—Mrs. F., æt. 42, had had pleurisy twenty years before she came under Mr. Godlee's care in July, 1888. Since the attack there had been permanent dulness on the right side. At Christmas, 1887, she had another acute attack, and about one drachm of clear fluid was drawn off, with a hypodermic needle, in two parts of the chest. There was cough and expectoration, which soon became purulent. There was a submammary abscess, but without impulse on coughing. A piece of the ninth rib was removed just outside the angle of the scapula, and a quantity of pus with the material preserved in the specimen was evacuated.

For Wax Models, vide page 146, *Nos.* 3607 *to* 3610.

ATELECTASIS.—APNEUMATOSIS.—PULMONARY COLLAPSE.

Lungs which have never contained air are solid, the cells collapsed, and they sink in water. This is known as Congenital Atelectasis. After the lungs have been normally inflated certain parts, notably the margins, may again return to the fœtal state in consequence of some diseased condition—Apneumatosis; Pulmonary Collapse. This condition will be brought about by anything which impedes the free current of air into any part of the lung, so that the atmospheric pressure in the alveoli is insufficient to overcome the resistance of their walls. Such states may be outside the lung (*e.g.* Pleuritic effusion), or may depend upon some disease of its substance (*e.g.* Lobular Pneumonia).

It is important to distinguish between an airless condition of the lung dependent upon collapse and upon solidification. In the former state the lung can be readily inflated, in the latter it cannot.

Collapsed portions of lung are clearly marked off from the surrounding inflated parts and are depressed below the general surface.

The affected areas are usually of a dark red colour, but the shade depends upon the amount of congestion of the vessels. The consistency is increased, and the lung tough and non-crepitant, but after inflation resumes more or less completely its normal characters.

For Wax Model, vide page 146, *No.* 3611.

EMPHYSEMA.

An excess of air in the lungs is known as Emphysema.

Interlobular or Extra-vesicular Emphysema is the condition in which air is found in the pulmonary connective tissue, consequent upon injury to the lung causing rupture of the alveoli. The condition is precisely analogous to and often associated with Subcutaneous Emphysema: the air usually becomes readily reabsorbed. The air-bubbles appear like glass beads studding the surface of the organ. When decomposition has set in, gases may be found in the connective tissue, giving rise to the appearances met with in Interlobular Emphysema properly so called.

Vesicular Emphysema may be Hypertrophous or Atrophous. In the former condition the alveoli in the affected area are individually enlarged; in the latter many alveoli become fused by atrophy and absorption of the septa normally separating them. Emphysema is dependent, like the dilatation of any hollow viscus, upon diminished resistance of the walls or increased pressure upon them, or more usually to a mixture of the two conditions, the former being rather of the nature of a predisposing cause, the latter acting more directly. If the causes which produce emphysema only act temporarily the condition will be temporary (Acute Emphysema); but in the great majority of cases the condition is chronic.

Emphysema may affect nearly the whole of the lung (Large-lunged Emphysema), or be only partial, especially attacking the apex and margins of the organ (Nos. 3355 and 3356).

In large-lunged or Hypertrophous Emphysema the organ is considerably increased in size and is pale in colour except where pigment has been deposited. There is a loss of elasticity in the tissue, and large sac-like pouches are present at the apex and margins of the lung; these are produced by the fusion of adjacent alveoli (Nos. 3355 and 3356). If the lung be cut it is found to be sponge-like in texture. If dried after inflation and cut across, the enlarged alveoli remain open and appear as spaces of varying sizes with intervening bands and threads of wasted lung-tissue (Nos. 3357 and 3358).

Small-lunged or Atrophous Emphysema is characterized by marked atrophy of the pulmonary tissue. The change is usually general throughout the organ, but more noticeable at the margins and apex. Owing to this atrophy numerous alveoli become fused and give rise to larger spaces. The lungs are pale in consequence of the destruction of the capillaries, but this is often concealed by pigmentation. In Atrophous Emphysema the lungs tend to collapse when the chest is opened, in consequence of the atrophy of their tissue; but in the Hypertrophous form they do not collapse so much as they would do in health.

3355. A piece of lung at the free margin of which is a large air-sac formed under the pleura. If the specimen is held against the light, the outline of the lobules which have been destroyed will be evident. A broad dense pleural adhesion stretches between the air-sac and the adjacent part of the lung-substance. 2214

3356. Portion of an emphysematous lung showing a large air-sac underneath the pleura at the margin. The walls of the sac are membranous and in some places show the remains of the pulmonary alveoli, and are dotted with pigment granules. 557

3357. A piece of emphysematous lung which has been inflated and dried. By the fusion of neighbouring alveoli large bleb-like sacs are present at the margin of the specimen. One of these has been cut across to show the remains of the lung-tissue, which forms a delicate meshwork. If the specimen is held against the light the remains of the alveolar structure of the lung can be seen. 5196

3358. A specimen of emphysematous lung which has been inflated and dried. Large air-spaces have been formed by fusion of the alveoli. These spaces are traversed by delicate bands of undestroyed tissue. The lung-tissue remaining is much atrophied. 6121

For Wax Model, vide page 146, *No.* 3611.

Plastic Bronchitis.

Syn.:—Fibrinous, Croupous, Pseudo-membranous.

This rare condition begins in the bronchi and usually assumes a chronic character. It is characterized by the formation of fibrinous casts of the tubes which are expectorated.

Nearly all the bronchi may be affected, but sometimes the disease is more localized.

The casts are often distinctly laminated (No. 3359), and are composed of fibrine entangling in its meshes leucocytes, pus-cells, and epithelium, which is frequently fatty. Elastic fibres are often met with. They are soluble in alkaline solutions. Sometimes the casts are solid (No. 3360), but more usually are hollow cylinders containing mucus, pus, and air in their interior. They may form a complete cast of a tube and its ramifications (No. 3359).

The casts often show small nodular swellings at various intervals in their length. They are usually firm in consistency, and may be expectorated alone, but usually with ordinary bronchitic sputum.

The mucous membrane of the affected tubes is injected and often denuded of its epithelium. The parenchyma of the lung sooner or later shows evidence of inflammation.

Patches of collapse are common.

3359. Fibrinous casts from the bronchi. They are solid, and can be separated into layers, but are very friable. 2124

3360. A fibrinous cast from the bronchi which was expectorated. It is quite solid. 2360

3361. A similar specimen. 2250

PNEUMONIA.

Pneumonia may attack a large tract of lung-tissue and originate in the pulmonary alveoli (Lobar or Croupous Pneumonia), or may be more disseminated, attacking numerous small patches, originating, in many cases at least, in the small bronchioles—Broncho-Pneumonia, Lobular or Catarrhal Pneumonia. The latter kind is more commonly met with at the two extremes of life.

Acute Pneumonia may originate as a primary disease or complicate some other condition. In some cases it is dependent upon a specific micro-organism, the Pneumococcus; this organism is a diplococcus, and is characterized by being surrounded by a transparent membrane. It is very doubtful whether this micro-organism can really produce Pneumonia in certain states of the system or not. It is constantly present in the mouth, and is present in other morbid states than pneumonia.

Chronic Interstitial Pneumonia is an inflammation of the interlobular connective-tissue, and is sometimes spoken of as Fibroid Phthisis.

Acute Lobar or Croupous Pneumonia.—In the majority of instances the disease first attacks the upper part of the lower lobe. In the first stage, that of Engorgement, the lung will be found of an intense red colour, slightly swollen and œdematous, and of diminished consistency. It still crepitates on pressure and floats in water. Following rapidly on this is the state of Red Hepatisation. The epithelium-cells of the alveoli undergo fatty degeneration and desquamate, and become mixed with the inflammatory fibrinous exudation which fills the alveoli and renders the lung solid and airless, so that it sinks in water. Owing to the exudation the organ is increased in size, and may present on its surface the marks of the ribs. It is of a deep red colour, diminished in consistency, and on section has a granular appearance without any trace of the outline of the alveoli. The pleura over the inflamed area participates in the process (No. 3362).

When the exudation has reached a certain height the blood becomes squeezed out of the capillaries by the pressure, so that the organ assumes a much paler colour (Grey Hepatisation). Red and grey hepatisation often co-exist, and give the lung a mottled appearance, which has been compared to a piece of granite.

When grey hepatisation is present, a puriform fluid will escape from the cut surface. The lung is much softer than usual, in many cases almost pulpy. When the purulent exudation is more abundant, the condition is sometimes spoken of as "purulent infiltration."

With the stage of grey hepatisation, the inflammatory condition, having reached its height, may subside, and resolution occur. In such cases the exudation filling the pulmonary alveoli becomes partly absorbed and partly expectorated after undergoing fatty degeneration.

In some cases recovery occurs during the stage of red hepatisation.

In Pneumonia of embolic origin, such as occurs in the acute infective processes, the condition is usually quite limited, and may terminate in abscess or gangrene. The inflamed patches are usually met with at the margins of the lung, more especially at the lower part; they are not usually larger than a chestnut.

Broncho-pneumonia. Lobular or Catarrhal Pneumonia.—This affection is more usually met with in children, and is due to the spread of inflammation from capillary bronchitis. The changes are similar to those met with in the lobar form, but occur in small isolated patches. These patches may by coalescing give rise to larger tracts of disease, the condition then approaching the lobar form.

Small patches of collapsed lung are frequently seen in association with Broncho-Pneumonia. If the condition becomes chronic the affected areas are consolidated, and appear as yellowish patches. The inflammatory products may subsequently soften and produce cavities (Caseous Pneumonia).

Chronic Interstitial Pneumonia. Fibroid Phthisis.—In ordinary pneumonia the exudation takes place into the pulmonary alveoli, the interstitial connective-tissue being only secondarily involved. In Fibroid Phthisis the inflammation attacks the connective-tissue, which becomes infiltrated with exudation, which presses upon and tends to obliterate the proper pulmonary tissue.

The lung is much denser and more indurated than natural, and has lost its elasticity. On section large tracts of fibrous tissue can be seen traversing the organ; these, tending to contract, cause the lung to shrink. The bronchial tubes are often dilated. Caseous patches may be present in the inflammatory tissue, and by coalescence may form larger tracts, which soften and give rise to cavities. Sometimes tubercle is associated with this condition.

Abscess and Gangrene of the Lung.

Inflammation of the lung may terminate in abscess or in gangrene; but it is not likely to do so unless produced by an infective embolus. The size of pulmonary abscesses varies, but they are not usually more than one inch in diameter. They may burst into one of the bronchi, and discharging their contents through it, may ultimately heal. In other cases they open into the pleura, and may excite suppurative inflammation there, or if they communicate with a bronchus will cause pneumothorax.

In gangrene the affected parts are black and pulpy, sometimes of an ashen grey colour, and horribly fetid. The sloughing portions of lung may lie in an abscess-cavity, and are occasionally expectorated.

If an abscess has existed for any length of time the pulmonary tissue surrounding it becomes condensed by chronic inflammation and forms a definite limiting wall.

The lung-tissue in the neighbourhood of acute abscess or gangrene is usually in an advanced stage of inflammation.

Abscesses secondary to pyæmic infection are due to the mechanical and infective properties of emboli lodging in the terminations of the artery, and are consequently most commonly seen at the margins of the lung. They are usually small and multiple.

3362. A piece of pneumonic lung in the stage of grey hepatisation. The alveolar spaces are filled with inflammatory exudation, rendering the lung much more solid than normal, so that it would sink in water. The pleura is covered with lymph, which can be separated as a continuous membrane. The underlying pleura is opaque. 5909

3363. A piece of lung-substance in a state of grey hepatisation. The consistence is fleshy, the pulmonary alveoli being filled with exudation. The lung is pale in colour, except where pigmented. The pleura is covered with lymph, and at one part the adherent visceral and parietal layers are both present. 6500

3364. Portion of a lung from a case of pneumonia. The pleura is covered with lymph. In the lower part of the upper lobe is a depressed area rather darker in colour than the surrounding lung-substance. At the post-mortem the contrast in colour was much more marked. In this area the lung-substance is much softer, and probably represents an early stage of abscess or gangrene. The lung in the neighbourhood is consolidated by inflammatory effusion into the alveoli. 6462

For Wax Models, vide page 146, *Nos.* 3612 *to* 3620.

Pulmonary Phthisis.

In the vast majority of cases pulmonary phthisis is of a tubercular nature.

The tubercular nature of the affection may not declare itself at once, the case originating as a chronic form of Pneumonia independently of the Tubercle Bacillus. Syphilis may also lead to a chronic pneumonia with induration and contraction of the lung-substance, and patches of caseation (No. 3384).

It is probable that the different pathological appearances in phthisis depend rather upon the chronicity of the process than upon any essential differeuce in its nature.

Tubercular phthisis almost always begins in the apex of the lung and gradually extends to the base, so that if a section be made right through the organ the disease may be seen in its different stages in different parts. The precise situation of the initial lesion is doubtful; according to some the tubercles are first developed round the terminations of the small bronchioles, while others consider that they first appear in the perivascular lymphatic sheaths or on the walls of the alveoli. In the early stages the tubercles appear as greyish semi-translucent discrete nodules, which project a little beyond the cut surface, and are surrounded by a zone of injected vessels. Neighbouring foci coalesce and the inflammatory products project into and fill up the alveoli, rendering the lung solid (Nos. 3370 and 3371).

The non-vascular tubercular areas tend to degenerate from want of nutrition, and, undergoing fatty changes, form yellow areas which caseate and soften in the centre (Nos. 3370 and 3371). In more chronic cases caseation is not such a marked feature of the process, but the products tend to become fibroid and much denser (Iron-grey Induration).

When caseation sets in the patches soften and cavities or vomicæ of varying sizes are formed (Nos. 3374, 3375, and 3376). These vomicæ tend to increase in size, partly by confluence of neighbouring foci of disease, and partly by the breaking down of the lung-substance forming their walls. Neighbouring cavities may open into one another (No. 3373).

Vomicæ are usually more or less rounded in shape, but may be irregular and anfractuous from fusion of two or more. The interior of cavities which are progressing is ragged and shreddy (No. 3374), and often traversed by rounded cords and bands which have resisted the destructive process (Nos. 3376 and 3377). These bands may be the fibrous septa of the lung increased in thickness by chronic inflammation; in other cases they are the bronchi and blood-vessels (No. 3376). The latter, being deprived of the support of the lung-substance, and their walls being weakened, tend to become aneurysmal (Nos. 3379 and 3380). Profuse and fatal hæmoptysis is due, in the majority of cases, to the rupture of one of these aneurysms (Nos. 3379 and 3380).

In extreme cases the lobes of the lung may fuse by adhesion of the opposed pleural surfaces, and the destructive process may destroy, more or less completely, the whole lung, which is riddled with cavities (No. 3378). The pleura in the neighbourhood of tubercular lung is often considerably thickened and the parietal and visceral layers adherent (Nos. 3373 and 3385). A cavity may gradually reach the surface of the lung and bursting into the pleural cavity will give rise to Pneumothorax (No. 3377).

In more chronic cases, where there is a tendency for the cavity to contract and cicatrize, it is surrounded by a dense layer of fibrous tissue, and its interior is smooth and appears as if covered with mucous membrane. The openings of bronchi of varying size are often seen in pulmonary cavities and afford an exit for their purulent contents (No. 3378).

In favourable cases tuberculous nodules become calcareous (No. 3387), or may cicatrize (even after cavities have been formed) and lead to puckering and induration of the lungs. Such changes are most usually seen at the apex. If large vomicæ tend to contract there is often some recession of the chest-wall or displacement of the viscera.

In addition to the tubercles met with in the lung-tissue itself, similar nodules are commonly seen on the pleural surface or in the lymphatic glands (No. 3372), while tubercular disease of the larynx and trachea and of the abdominal viscera is common in advanced cases.

Acute Miliary Tuberculosis.—In cases of general tuberculosis the lungs are found to be thickly studded with numerous grey and yellow granulations (No. 3383). They are usually scattered pretty uniformly through the lung, which is in a condition of acute inflammation.

In Acute Phthisis the changes are essentially the same as those already described, but the destructive process proceeds much more rapidly.

3370. A slice from an injected lung extensively affected by tubercle. The pale degenerating tubercular nodules offer a marked contrast to the unaltered lung-substance.

The disease is very much more advanced in one lobe than the other, the foci of disease having coalesced and so rendered the lung almost solid. One or two small cavities are seen in section. The lymphatic glands in the root of the lung are pigmented and infiltrated with tubercle.

The specimen is from a girl aged thirteen. 3529

3371. A slice of a tubercular lung. It is almost solid throughout, but shows many small cavities and one larger one. Scattered through the substance of the lung are pale patches of tubercle undergoing fatty degeneration. The pleura is thickened and covered with lymph. At one spot there is a small cavity immediately under the pleura, which has been destroyed in this situation, the pleurisy probably resulting in consequence of this. 2445

3372. The tongue, larynx, trachea, and lungs of a child. The lungs are infiltrated with yellow masses of degenerating tubercle. The bronchial glands are similarly affected and form large masses round the bifurcation of the trachea and roots of the lungs. 5918

3373. A portion of the left lung of a man who died of tubercular phthisis. The pleural surface is thickened and shreddy in consequence of being torn away from the chest-wall to which it was adherent; at the apex of the lung the pleura is considerably thickened. The lung-substance is consolidated, except at the extreme base. There is considerable overgrowth of the connective tissue. The cut surface shows several large intercommunicating cavities, especially at the apex and upper part of the organ. The interior of these is lined by a sloughy-looking material. The surrounding lung-substance is extensively infiltrated with cheesy tubercles. At the root of the lung enlarged black bronchial glands are seen. 6420

History.—Louis Carter, æt. 46, was admitted into the hospital on November 17th, 1888, under the care of Dr. Bastian. On October 22nd he felt ill and went to bed; previously he had a slight cough and had lost flesh. Expectoration ash-grey and dirty-looking. When admitted he had acute phthisis with rapid breaking down of the lung-tissue. The temperature was not high; there was no hæmoptysis and no pain. Slight diarrhœa. November 24th, abdominal pain. Death occurred on November 26th.

Post-mortem Examination.—Both lungs were diseased, especially the left; firmly adherent to chest-walls. Cavities in both. Small intestine much ulcerated, some of the ulcers measuring 1 by $\frac{1}{2}$ inch; in one of these the peritoneum had a sloughy appearance over an area $\frac{1}{3}$ inch in diameter, and some others showed a tendency to slough. Kidneys and liver showed associated fibro-fatty change in an early stage. Other viscera normal.

Vide Dr. Bastian's *Case-book*, Males, 1888.

3374. A piece of lung from a child. The surface of section shows numerous foci of degenerating tubercle. By the confluence of several foci of disease a cavity has been formed at one part immediately under the pleura. The pleura is covered with a thick layer of lymph, which has been partly reflected as a continuous membrane. The pleura thus uncovered is thickened and opaque. 1815

History.—The specimen was from a little girl aged one year and five months. She had continued cough with much purulent expectoration and shortness of breath.

3375. The apex of a lung in which is a cavity measuring two inches in its longest diameter. The interior is rugose, but not shreddy. The wall varies in thickness in different places, at the thinnest part it is formed of thickened pleura, the lung-substance having almost entirely disappeared. The pleura is thickened, opaque, and was evidently adherent. On the cut surface of the lung are small yellow areas of consolidation. 1090

3376. A piece of tuberculous lung which has been injected. A large cavity projecting immediately under the pleural surface is seen at the upper part of the specimen. This cavity contains the branching bronchial tubes and vessels which have resisted destruction; they are covered with inflammatory material in a caseous condition.

A commencing cavity and numerous tubercular patches are seen lower down. The tubercular areas are easily recognizable by their pale colour, as they are non-vascular.

3377. A piece of lung extensively destroyed by tubercular phthisis. Numerous cavities communicating with one another, and traversed by rounded cords replace the normal lung-substance. These cords are the vessels which have resisted the destructive process. A glass rod has been passed through a communication established between one of the cavities and the pleural sac. Close to the aperture on the surface of the lung is a dense band of adhesion. The condition would have given rise to pneumothorax. 4946

3378. The left lung from a case of tubercular phthisis. It has been laid open. Very little lung-tissue remains, the whole organ being studded with cavities, in many cases containing tubercular material. Some of these cavities communicate, others are perfectly distinct. The bronchi are dilated. The walls of the cavities are composed of more or less dense fibrous tissue, but in the more recent ones this is not seen. The pleura is thickened, especially towards the base of the lung. 5300

History.—Emma Bird, æt. 21, was admitted to the hospital in about the fifth month of her illness. There was no history of phthisis in the family. She had had hæmoptysis early in the disease, and this had been repeated. The expectoration was frothy and muco-purulent. There was emaciation, night-sweats, and diarrhœa.

For two days before admission the breath was offensive. She died from profuse hæmoptysis.

3379. A piece of tubercular lung showing an aneurysm of a branch of the pulmonary artery. The lung is extensively broken down by tubercle, and just above the aneurysmal dilatation is part of the wall of a cavity into which the sac ruptured. Part of the pleura is adherent to the lung. It is thickened, and underneath it is caseous tubercular material. 5272

History.—Margaret Wheeler, æt. 30, was admitted into the Brompton Consumption Hospital, at the end of the third month of her illness. There was no family history of phthisis. The patient suffered from profuse night-sweats, loss of flesh, diarrhœa, cough, dyspnœa, and hæmoptysis. Two weeks before admission she had spat up one ounce of blood. On admission there was evidence of a cavity, and soon after one was found at the right base; this gradually increased in size in an upward direction.

Death was due to hæmoptysis.

3380. A portion of lung affected by tuberculosis, showing an aneurysm of a branch of the pulmonary artery which burst into the cavity in which it lies and caused death. Two rounded cavities are seen in the specimen; their walls are dense. Lying at the lower part of the lower cavity is the sac of an aneurysm measuring about ½ inch in diameter; a piece of blue glass has been passed through the vessel. There is no trace of fibrine lining the sac. Caseous tubercular nodules are scattered through the substance of the lung, which was adherent to the parietal pleura. 5234

History.—Mr. M., æt. 41, had suffered from pulmonary symptoms for three months before death. Sudden hæmoptysis occurred one day to the extent of half a pint of blood; this recurred several times during the following week, but after being arrested for some days it recurred with great violence and the patient died asphyxiated.

At the *post-mortem* miliary tubercle and cavities of varying size were found in the apices of the lungs. The aneurysm seen in the specimen had ruptured.

3381. Part of the right lung, with the heart, pericardium, and great vessels, and the bronchial lymphatic glands. The lung is extensively infiltrated with caseating tubercle, and a branch of the pulmonary artery has been laid open by extension of the disease to it; this is marked by a bristle. The lymphatic glands are also diseased, and form a firm mass round the trachea and great vessels. The mucous membrane of the trachea at its point of bifurcation is ulcerated. The pericardium has been reflected, and numerous tubercular deposits are seen dotting its surfaces; these are most numerous towards the base of the heart. 4771

3382. Part of a lung affected by tubercle. Close to the root is a large cavity measuring about 1½ inches in diameter, containing a large blood-clot. A second smaller cavity is seen on the surface of section. The cut surface shows numerous yellow consolidated patches. 2213

3383. The left lung of a child, who died of general tuberculosis. The surface is studded with small yellow nodules about the size of a pin's-head; they form small projections under the visceral pleura. These are miliary tubercles. Similar tubercles were found in the spleen, liver, and kidneys, and in the other lung. The disease was, however, much more advanced in the lungs than elsewhere. The child was rickety. 6422

3384. A slice of lung from a case of syphilitic cirrhosis. The section is traversed by bands of dense fibrous tissue. These are most abundant at the lower part of the specimen, where the lung is almost solid. The pleura is slightly thickened and roughened by adhesions which existed between the two surfaces. The lung is pigmented. 6431

3385. A lung from a case of chronic phthisis. The pleura is very much thickened and increased in density, and so adherent that in removal of the lung from the body muscular tissue has come away with it. The lung-substance is barely recognizable, being in a state of extreme cirrhosis, and being excavated by numerous cavities. Glass rods indicate the position of some of the larger bronchi. At the upper part is a large smooth-walled cavity, opening into which are large bronchi. 5614

History.—Kate P., æt. 35, was admitted into the hospital under Dr. Ringer on June 2nd, 1881, and died on June 10th. There was no family history of phthisis. She had been a moderate drinker. One year before death she had dropsy of the legs and abdomen; this recurred in April 1881. About a month before admission she complained of shortness of breath and swelling of the left arm and side of the neck. The ascites gradually increased. On admission there was dulness over all the left front and a considerable quantity of greenish muco-purulent expectoration. At the left apex there was amphoric breathing, and lower down cavernous. Vocal fremitus was almost lost at the left apex. The symptoms gradually increased, and the patient died of exhaustion. At the post-mortem examination there was found mitral regurgitation with hypertrophy and dilatation of the heart and cirrhosis of the liver. There were four vomicæ in the right lung; the left is preserved in the specimen. The left subclavian vein was occluded by clot.

Vide Dr. Ringer's *Case-book*, Females, 1881, p. 802.

3386. A slice of lung from a case of phthisis. It is quite solid and darkly pigmented throughout. The pleura is thickened, and the section is intersected in every direction by broad and dense bands of fibrous tissue. The lung-substance is broken down and riddled with small cavities communicating with each other. Numerous pale caseous areas are seen in the lung, and similar patches are present in the pigmented lymphatic glands. In some cases these caseous areas show small central cavities due to degeneration. 5466

3387. A mass of calcareous material removed from the substance of a lung. 1452

3388. Calcareous material from one of the bronchial glands. 1122

For Wax Models, vide page 147, *Nos.* 3621 *to* 3625.

PULMONARY APOPLEXY.—EMBOLISM.

Pulmonary Apoplexy is the name given to the condition in which the lung-tissue is more or less extensively ploughed up and infiltrated with blood, consequent upon the rupture of a vessel. It may be dependent upon the bursting of an aneurysm (No. 3382), or of an artery weakened by suppuration or gangrene in its neighbourhood, or it may be traumatic. Any part of the lung may be the seat of the hæmorrhage.

The blood infiltrates the pulmonary tissue and the alveoli, rendering he affected area solid and of a dark red colour (No. 3389).

The outline, unlike that in hæmorrhagic infarction, is irregular and not sharply defined. Such hæmorrhages are usually fatal if at all extensive.

Hæmorrhagic Infarction. Embolism (No. 3390).—Emboli impacted in the branches of the pulmonary artery may cause hæmorrhagic infarction. For this to occur it is necessary that the occluded artery should be "terminal," *i. e.* that there must not be any branch between the impacted embolus and the capillaries into which the vessel divides. For this reason hæmorrhagic infarction is much more commonly seen at the periphery of the lung. When it occurs in the deeper parts there are always infarctions at the periphery, and these have rendered the deeper vessels practically terminal.

An embolus thus lodged in a vessel causes stagnation of blood in that vessel, its capillaries, and the veins returning the blood from the area supplied by it.

The red cells soon escape from the vessel-wall into the lung-substance, producing a hæmorrhagic infarction.

The infarcts are wedge-shaped, the base being at the periphery of the lung, and are clearly outlined from the surrounding lung-substance above which they project. The pleura over an infarct is often covered with inflammatory lymph. If cut across, the wedge-shaped mass is seen to be of a dark blue colour, hard and solid, and sometimes surrounded by collapsed lung. Hæmorrhagic infarcts are usually multiple.

If the patient survive, the subsequent changes in the infarct depend upon circumstances. If the embolus is of an infective nature, suppuration and gangrene may occur. If not, the fluid parts of the extravasated blood become absorbed, and the fibrine becomes fatty and subsequently absorbed or expectorated. The red cells break up and their pigment deeply stains the lung-tissue. In other cases a cicatrix remains, or the lung-tissue is collapsed; very rarely a hæmorrhagic cyst results.

Large clots impacted in the main trunk of the pulmonary artery cause sudden death from asphyxia.

3389. Part of a lung from a case of pulmonary apoplexy. The incision made in the specimen passes through two blood-clots. These are decolorized from immersion in spirit, but they can be clearly distinguished from the surrounding lung-substance by their greater density. The lung-substance is denser than natural, especially at the upper part; it was adherent to the chest-wall. 1375

3390. Part of a lung, with the pulmonary artery laid open to show emboli, which came from the heart. At the upper part of the specimen one branch of the vessel is completely filled with a firm clot, which extends into the smaller branches. Some of these are indicated by bristles, and are seen to be full of clot. At the lower part another branch is seen occluded by clot. The lung-substance is unaltered, and there are no infarcts. 5467

MORBID GROWTHS OF THE LUNGS AND PLEURÆ.

Cancer and Sarcoma may occur in the lungs as primary growths, but are much more commonly secondary to disease elsewhere. The growths occur as rounded nodules of varying size, often projecting on the surface and sometimes fungating (No. 3400), but sometimes being scattered throughout the substance of the organ (Nos. 3393 and 3399).

Malignant tumours are very liable to degenerate. They may grow into the bronchi (No. 3391) and give rise to hæmorrhage from the lungs. The lung-tissue in the immediate neighbourhood of the growth is frequently in a more or less advanced state of pneumonia, and if the masses project on the surface acute pleurisy may result (No. 3398).

Sometimes the malignant growth may be met with immediately under the pleura and not involving the lung-substance at all (Nos. 3393 and 3395). In such cases the margins of the lungs are especially liable to be the seat of the growth, which forms more or less flattened and pedunculated masses, quite smooth on the surface. These masses may coalesce to form large tracts of disease (Nos. 3396, 3397, and 3403).

Hydatid Cysts are sometimes found in the lung (Nos. 3404 and 3405). They may originate there or may spread from the liver, by destoying part of the diaphragm. These cysts may rupture into the bronchi, and may then either cause death by asphyxia or, the contents being expectorated, the cyst may shrink and be permanently cured. In other instances the cyst ruptures into the pleura, pericardium, or mediastinum.

Dermoid Cysts.—No. 2219 A in the Surgical Catalogue is a specimen of the contents of a dermoid cyst of the pleura. The patient was under the care of Mr. Godlee at the Brompton Consumption Hospital.

3391. Part of a left lung extensively infiltrated by new growth. The structures in the root of the lung are compressed by the growth. The bronchus is narrowed to a mere chink and the growth has spread into it. The pulmonary artery is almost occluded, but there is no growth to be seen in it. The veins are also compressed. The growth is dense in consistency. 2057

Microscopic Examination.—The tumour consists of a dense stroma of fibrous tissue enclosing alveolar spaces filled with epithelium-cells. It is a scirrhus cancer.

3392. The arch of the aorta with part of the trachea and root of the left lung. The root of the lung is surrounded and invaded by a new growth of dense consistency. The left pulmonary artery is narrow and puckered in consequence of pressure. The growth has passed behind the aorta and projects between it and the œsophagus. The aorta has not been narrowed by the tumour; it is atheromatous. The anterior wall of the œsophagus is bulged backwards. The left vagus and recurrent nerves are involved by the tumour. The lymphatic glands are secondarily affected; a mass of these has been laid open and shows a cavity due to degeneration. The mass at the lower part of the bottle is a gland removed from the neck. A piece of the carotid artery is adherent to it. 4591

History.—Mr. I., æt. 68, a farmer, had, until twelve months before death, enjoyed remarkably good health. At that time he had a slight cold with loss of voice; this returned, and he always complained of dyspnœa on exertion. Two or three months later his appetite failed and he began to lose flesh. Three months before death he suddenly lost his voice, only being able to speak in a whisper. He occasionally spat up a small quantity of blood. No new symptoms appeared, but he gradually became weaker. There was no pain. About a fortnight before death he caught cold and had an acute attack of pleurisy on the left side, which proved fatal on the twelfth day.

The mediastinal growth was diagnosed during life.

3393. The right lung and a portion of the diaphragm from a child whose leg had been amputated on account of a sarcomatous growth affecting the calf-muscles. The lung is studded with nodules of new growth. Some of these are embedded in the substance of the organ, others project on the surface as pedunculated tumours. Numerous nodules are seen under the pleura, especially along the margins of the lung. These masses are quite pedunculated and do not spread into the lung-substance. Similar growths are seen on the pleural aspect of the piece of diaphragm. All the growths have a distinct resemblance to brain-tissue. 4784

History.—The specimen is from the same case as the one preserved in the Surgical Collection, No. 2111, which consult for full history of the case. At the post-mortem examination the whole of the left lung was found adherent to the pleura; its upper lobe was entirely replaced by new growth, which had also extensively invaded the lower lobe. The pericardium was thickly covered externally with similar masses of growth, but none were found internally or in the heart. There were no secondary deposits in any of the abdominal organs. In the MS. Catalogue the growth is spoken of, in accordance with the nomenclature of the time (1861), as Encephaloid Cancer.

3394. Part of the sternum, with the third to the sixth costal cartilages and parts of the ribs, from a child. Growing over the costo-chondral junctions of the fourth, fifth, and sixth ribs is a rounded tumour, quite smooth on the surface and brain-like on section. The growth has spread through the intercostal spaces to the thoracic cavity, and the lung is adherent to it. A second, quite distinct mass is situate opposite the third interspace. 556

Microscopic Examination.—The growth is a round-celled sarcoma.

3395. A left lung, the pleural covering of which is extensively affected by new growth. The growth forms rounded flattened masses quite smooth on the surface, and in some instances the edges are overhanging, giving the mass a mushroom shape. They are moderately firm in consistence, and in general appearance resemble brain-substance. The growth is strictly limited to the pleura and does not invade the lung. 5057

Microscopic Examination.—The growth is a small round-celled sarcoma.

3396. Part of a lung which is thickly studded with smooth rounded masses of soft new growth. They closely resemble brain-substance. The masses are much larger and more numerous on the surface than in the centre of the lung. 4581

Microscopic Examination.—The growth is composed of round cells without any alveolar stroma. It is a round-celled sarcoma.

History.—J. K., a melancholic theomaniac of the sect of "Ranters," was admitted under Dr. Walshe's care on December 21st, 1856. About six months before admission he became subject to failure of memory and fits of rage. Three weeks before he took to his bed from bodily weakness; since then was drowsy and stupid, but hardly slept at all. He answered questions reluctantly; he only complained of slight headache. He lay still in bed and passed his exercta under him, it seemed as if from pure disinclination to move. He died January 11th, 1857, apparently from inanition. He was quite conscious up to the last and never paralysed. He had no cough or any other symptoms referable to the chest.

Post-mortem Examination.—Right lung infiltrated throughout its lower half with "Encephaloid Cancer" (formerly all soft malignant growths were known by this name); left lung crowded with nodules of the same growth. Brain studded with over twenty masses of growth, in size from a small pea to a large nut.

Vide 'Diseases of the Lungs,' Walshe, 4th ed. p. 525.

3397. A piece of lung affected by sarcoma. Two large masses are seen projecting on the surface; they are not encapsuled, though quite circumscribed. Smaller masses, situate immediately under the pleura, are seen along the free margins of the lung. 2392

3398. A piece of lung with a large mass of soft new growth. The growth is distinctly circumscribed but not encapsuled; its cut surface is homogeneous and soft, but at the lower part is slightly pigmented. On the under surface ulceration has occurred, but on the upper the pleural covering is coated with inflammatory lymph. The growth is a sarcoma of secondary origin. 4000

3399. Portions of lung showing rounded masses of secondary sarcoma. On the surface of one piece are two fungating masses which have been bisected: the surface is rough, having been torn during removal. On the surface of section rounded, distinctly circumscribed, reddish masses are seen; in some instances these are at the periphery, but many are in the centre of the lung, the tissue surrounding them being healthy. The masses are red in colour, distinctly circumscribed, and firm in consistency. On the cut surface of the smaller piece of lung is a large mass measuring about an inch in diameter; it has undergone central degeneration and softening. The pleura is coated with lymph. 6478 A

Microscopic Examination shows the growths to be composed of small round cells with very little stroma. Extensive extravasation has taken place into the substance of the growths.

History.—Elizabeth Tindall, æt. 25, was confined on July 19th, 1889. There was no difficulty in the labour, and the patient was up on the tenth day. The discharges were not excessive, nor was there any fetor. On the eighteenth day she resumed her work. A week later she passed, during micturition, five or six hard black lumps, and stayed in bed after this for a week. This recurred, accompanied by bleeding, and a third time on August 28th, when a foul discharge appeared. On September 2nd she was admitted into the hospital under Dr. Spencer; she was very ill and blanched: the pulse was weak and 135. Pieces of foul placenta were removed on two occasions and the uterus washed out with 1-2000 mercury solution. On

September 20th she had three rigors and pains in the chest. On 25th there was left-sided hemiplegia, sensation and speech were unaffected, and there was no facial paralysis. There was a loud apex-murmur. The patient was transferred to Dr. Bastian on September 26th. Respiration 40, slight cough. Pulse 124. Friction was heard in the right axilla. The left knee-jerk was excessive, no ankle clonus; plantar reflex exaggerated. On right side, ankle clonus present, plantar reflex absent. The right lower limb gradually became œdematous, and on September 30th there was right facial paralysis; she died in the evening, the rectal temperature being 95°.

Post-mortem Examination.—Uterus enlarged: gangrene at placental site; masses of new growth at cervix (*vide* Obstetric Catalogue, old number 6481 A). Aortic and mitral valves slightly thickened. Yellowish fluid in excess in pleural cavities. Left lung adherent. In each lung about thirty to fifty masses like those preserved in the specimen. Kidneys, spleen, and liver very anæmic. *Brain*: pia mater injected over the left upper frontal and parietal regions; the veins were thrombosed, the clot extending into the lateral and superior longitudinal sinuses. Transverse sections of the affected area show mottling from congestion and extravasation. Brain-substance softened. Corpus striatum and other parts normal but very pale. No similar change in the left hemisphere. (*Vide* No. 3483.)

Vide Dr. Bastian's *Case-book*, Females, 1889.

3400. The left lung of a patient who died from sarcoma of a retained testis with secondary deposits in the liver, kidneys, and lungs. The organ is the seat of numerous round nodules of new growth; they project on the surface, but many others are embedded deeply in the substance of the lung. Some of the growths are umbilicated on the surface. A section has been made through the upper part of the upper lobe, and four round circumscribed nodules are seen cut across. 6229

Vide Surgical Catalogue, 1928 A. Also No. 3149.

3401. A heart with the great vessels, trachea, œsophagus, and part of the right lung. The superior vena cava has been laid open to show a sarcomatous growth which has invaded its walls and projected into the lumen of the vessel. This growth is continuous with one invading the root of the lung and growing into its substance.

3402. A specimen of spindle-celled sarcoma intermixed with cartilage which has become ossified, growing in the mediastinum and involving the lung. The specimen is from the same case as Nos. 663 and 664, Surgical Catalogue, Part I. page 115. Numerous nodules are seen in the lung, and one projects into the bronchus, which has been laid open. 4137

3403. The left lung from the same case as No. 3019. Scattered over its surface are flattened plates composed of fibrous and calcareous material. They are white on the surface and puckered, the puckering extending to the surrounding pleura. In the substance of the lung similar masses about the size of a pea are found. 4181

For the history of this case and other specimens from it *vide* No. 3019, and Surgical Catalogue, Part I. No. 671; also Pathological Transactions, vol. vi. p. 317.

3404. The left lung from the same case as Nos. 3161 and 3162. Situate in the lower end of the upper lobe is a hydatid cyst. The parasitic cyst-wall is not present; there is no communication with the bronchi. The fibrous wall is wrinkled internally. Projecting downwards from the upper lobe is a thin tongue-like process of lung-tissue representing a third lobe. 4092

History.—The specimen and those referred to above were from a child aged 5 years, who had always been in good health, but was suddenly attacked with intense dyspnœa and died in a few hours.

3405. A small piece of lung in which are two hydatid cysts. They communicate with one another by a circular opening. The parasitic cyst-wall is still present. The adventitious wall is clearly marked off from the surrounding lung-substance, which is unaltered. 2691

For Wax Models, vide page 148, *No.* 3627.

SERIES L.—DISEASES OF THE SUPRA-RENAL CAPSULES.

ADDISON'S DISEASE.—TUBERCULAR INFLAMMATION.

In cases of extensive destruction of the adrenals, whether by tubercular disease or simple atrophy, the patient falls into a condition of extreme prostration, subsequently terminating fatally. In addition the skin generally becomes pigmented or 'bronzed' from a deposition of pigment in the cells of the rete mucosum. The precise causes of the condition are not known; that it is not solely dependent upon the destruction of the capsules is shown by the fact that when they are extensively involved in malignant and other tumours, the characteristic symptoms of Addison's disease are not present. Nor has it been shown that after removal of the capsules experimentally the animals operated on have developed similar symptoms. It is probable that Addison's disease is in some way due to interference with the nerves of the solar plexus and the semilunar ganglion, producing vasa-motor paralysis of the abdominal vessels.

In cases of tubercular disease the adrenals are considerably enlarged, altered in shape, and their consistency increased (Nos. 3410 and 3413). The connective tissue enveloping the organ is increased in amount and is tougher than normal (No. 3412). If laid open, no trace of normal glandular elements can be found; this is especially noticeable in the medullary portion, which is the part first affected by the disease (No. 3411).

In the cortical part traces of the cells may be found in an advanced state of degeneration (No. 3411).

Caseating masses of tubercle are found scattered through the organ in the earlier stages, but these soon fuse so that the whole mass is formed of yellow degenerated tubercle (No. 3413). In some cases this becomes extensively calcified. In fresh specimens a distinction can often be made out between the cortical and medullary parts, as the caseous process is more marked in the latter, while in the former there is frequently an increase in the fibrous elements, giving it a greyish semi-translucent appearance of greater consistency. The capsules are adherent to surrounding parts by inflammatory thickening.

In the majority of cases there is pulmonary phthisis.

In cases of general tuberculosis grey granulations may be found scattered through the substance of the adrenals as in other organs (Nos. 3410 and 3413, History).

No. 3414 is a specimen from a case of Addison's disease in which the supra-renal capsules are completely atrophied, being represented by thickened connective tissue only.

3410. The right supra-renal capsule from a patient who died of Addison's disease. The capsule has been laid open: it is enlarged and altered in shape. There is no distinction between the medullary and cortical portions of the organ; scattered through the substance are numerous yellowish nodules of caseous material; one of these is as large as a hazel-nut. The other capsule was in the same state. 5236

History.—William Birchmore, æt. 31, was admitted into Univ. Coll. Hospital on April 25th, 1866, complaining of "pain in the bowels and legs and of general debility." He had always been "delicate" and had suffered from rheumatism. No history of syphilis. Had been used to drink about a gallon of porter daily and occasionally gin as well. He had suffered from general prostration and pains in the parts mentioned, accompanied by vomiting. There was no bronzing of the skin or discoloration of the mucous membranes. He died on April 27th, 1866.

Post-mortem Examination.—Body emaciated. Small caseous nodule in the apex of each lung, but nothing else abnormal in them. The condition of the adrenals is illustrated by the specimen. The stomach was much congested at the cardiac end. The intestines were also injected, and the solitary glands in the lower part of the ileum very prominent and almost pedunculated (No. 3070).

Vide Trans. Path. Soc. 1866, p. 401.

3411. The supra-renal capsules of a woman, æt. 33, "of strumous constitution." The left one, the larger, has been laid open. It has lost its normal shape and consists of a fibrous envelope containing a friable mortar-like material. The right capsule is in a similar but less advanced state of disease. When fresh the caseous matter was soft and on pressure yielded a milky-looking fluid. No normal gland-substance could be detected by the naked eye. Microscopic examination of the organs after hardening in spirit showed that the medullary portion of the organ had quite disappeared from both capsules, its place being taken by caseous tubercular material. The cortical substance was only represented by a few broken-down cells occurring in isolated patches. 4301

History.—The woman had been under treatment for about eight years for "Hepatic and uterine derangement." "The general surface of the skin was opaque, rather of the tint called dusky or freckled brown, than of a bronze colour.

"At the post-mortem all the abdominal organs were found adherent to each other and to the walls by strong bands of adherent lymph. Liver large, highly congested, soft and easily broken down. One or two masses of tubercle on its surface. Spleen large. Lymphatic glands large and congested." It is noticeable that, although the supra-renals must have failed to be physiologically active for some time, there was no bronzing of the skin.

3412. A kidney with the supra-renal capsule from a case of Addison's disease. The kidney is apparently healthy. The supra-renal is enlarged and infiltrated throughout with tubercular material which has caseated. The capsule is thickened. 6269

3413. The left kidney and supra-renal capsule of a man aged 35 who died of acute phthisis. The adrenal is considerably larger and firmer in consistence than natural. The capsule is thickened and the cut surface does not show the naked-eye characters of the organ, but is composed of a mass of yellowish tuberculous material. The greatest thickness is $1\frac{1}{8}$ inch, but in the recent state its measurements were three inches broad, two inches high, and $1\frac{1}{4}$ inch thick; the right capsule measuring $1\frac{1}{2}$ inches broad, two inches high, and $\frac{3}{4}$ inch thick. 4300

Microscopic Examination.—The medullary substance in each capsule was entirely replaced by tubercular matter. The cortical substance was only represented by isolated patches of cells, seen especially close under the capsule.

History.—The patient was under the care of Dr. Walshe in University College Hospital. There was nothing in the general history of the case worthy of special note. Soon after admission the patient died of acute tubercular phthisis. It is noticeable that although the adrenals must have been the seat of disease for some considerable time, there were no signs of bronzing of the skin.

Vide Pathological Transactions, 1858, vol. ix. p. 410.

3414. The kidneys with the remains of the supra-renal capsules, and neighbouring vessels and nerves from a case of Addison's disease. The adrenals are extensively atrophied, consisting merely of the fibrous investment, still retaining its normal shape, containing a mere trace of pale glandular substance, which on microscopic examination gives evidence of the columnar arrangement of the cortex. The semilunar ganglia and solar plexus have been dissected out and do not show any naked-eye changes. The capsule of the left kidney has been removed. At the margin of the organ in the lower part is a depression, and an incision through this showed a lenticular-shaped nodule, about half an inch thick, of whitish colour and tough and leathery in consistence. Microscopic examination proved this to be a gumma; with this exception the kidneys were healthy but a little congested. 5930

History.—The patient was a woman, æt. 42, who was under Dr. Barlow's care at University College Hospital. She came to the Out-patient department in September 1882, complaining of feeling very weak and tired. She had become very brown in colour. She had had three children. The general health had been good. She probably became pregnant in October. She attended the hospital at intervals and was admitted in February 1883. At this time there was general brown pigmentation of the whole skin, most marked on the neck, especially behind and in the axillæ, also round the nipples and extending to both flanks and groins. There were some pigmented spots in the mucous membrane of the mouth.

The temperature was sometimes subnormal and occasionally 99°·6. Pulse 96. Urine free from albumen or sugar: sp. gr. 1020. The principal symptoms were intense prostration, bronzing of the skin, and constipation. She left the hospital in sixteen days, benefited by the rest. On July 13th she was confined of a still-born child, and went on well till the 16th, when vomiting and intense prostration set in. On July 22nd she was again admitted to the hospital, but in such a weak condition that no examination could be made. On the fourth day she died, apparently from asthenia, the temperature during this time ranging from 99°·6 to 102°·2. At the post-mortem examination nothing of any importance, except the specimen, was discovered. The liver was fatty.

Vide Pathological Transactions, vol. xxxvi. 1885, p. 433.

3415. Two stuffed rats. The white one had the spleen and supra-renal capsules extirpated when it was only a month old, and quite small. It increased in size after the operation, quite as fast as its fellows which had not been touched. The animal was killed when five months old, and no discoloration of the skin or hair could be detected. The lumbar and other lymphatic glands were found enlarged.

The piebald rat had the right adrenal removed and died on the seventh day. The organ was considerably enlarged. On microscopic examination it was found to be the seat of extensive tubercular disease. At the post-mortem it was found that the left supra-renal was quite healthy. 4226

Vide 'British and Foreign Medico-Chirurgical Review,' 1858, vol. xxi. p. 204; "Harley on the Supra-renal Capsules."

SERIES LI.—DISEASES OF THE KIDNEYS.

ATROPHY OF THE KIDNEY.—HYDRONEPHROSIS.

If there is any obstruction to the free flow of urine the pelvis of the kidney becomes dilated in consequence of the increased pressure on its walls. Following upon this the pressure produces atrophy of the renal substance, and in severe and advanced cases hardly a trace of this remains (Nos. 3418 and 3419). The kidney is represented by a large fibrous sac subdivided into loculi by the persistence of the fibrous septa.

In large white kidney secondary atrophy may occur. *Vide* Bright's disease, page 107.

For further information and specimens *vide* the Surgical Catalogue, Part II. page 399.

3416. A kidney laid open showing dilatation of the pelvis with a slight degree of atrophy of the secreting substance. One of the pyramids is soft and spongy, and was probably inflamed. 4794

3417. A kidney laid open to show a large branched uric-acid calculus lodged in the pelvis and calices. The renal substance has undergone almost complete atrophy, and can only be traced in one or two places. The stone passes down into the ureter and completely blocks it. The surface of it is, in some places, coral-like. The ureter is thickened.

3418. A specimen of hydronephrosis. The pelvis and calyces are dilated and the renal substance has undergone atrophy from pressure. There is still, however, some cortical substance left. The dilated pelvis is quite smooth internally. 3380

3419. A specimen of hydronephrosis. Hardly a trace of kidney-substance remains, but in some parts the cortex is still to be found. The pelvis has been dilated, and the renal substance absorbed as the result of pressure. The interior of the pelvis is quite smooth and polished. The kidney was not apparently increased in size. 4188

For Wax Models of Dilated Pelvis and Atrophy, see page 148, *Nos.* 3628 *and* 3629.

CYSTS OF THE KIDNEY.

Simple Cysts varying considerably in size are very frequently met with in the kidneys of adults, especially in cases of granular contracted kidney. Sometimes the renal substance is quite healthy, the cyst being the only morbid condition present (No. 3420). The cysts originate by dilatation of the uriniferous tubules, and are most numerous in the cortical substance (No. 3421), often projecting on the surface and being torn open when the capsule of the organ is removed. The walls are thin and transparent, and lined by epithelium; the contents are clear, yellowish in colour, and often contain albumen, salts, and cholesterine and uric acid, but not usually urea (Nos. 3423 to 3427).

Cystic Degeneration of the kidneys in middle life is more usually met with in men than women, and is generally bi-lateral (No. 3424). The kidneys may attain an enormous size, and the renal substance can be only detected by microscopic examination. The organ is converted into a cluster of cysts, varying in size, with their translucent walls lined by epithelium, and usually separated from one another by the thickened connective-tissue framework of the kidney (No. 3424). In other cases adjacent cysts communicate by fusion and absorption of their walls. The trabecular structure separating the cysts contains the remains of the renal substance. The contents of the cysts varies; usually it is clear and limpid, often of a yellowish colour containing albumen, but no urinary deposits. Sometimes the fluid is deeply stained by altered blood-pigment (No. 3424). If a section be made of the kidney the cut surface presents the appearance of a coarse sponge (No. 3426). The cysts appear to originate by dilatation of the uriniferous tubules and Bowman's Capsule.

In some cases similar cysts, but smaller and less numerous, are met with in the liver (No. 3425) and brain. This association seems to suggest some cause (perhaps parasitic) tending to produce general cystic degeneration.

Hydatid Cysts.—Hydatids are occasionally met with in the kidney, frequently in association with a similar disease of the liver. The cyst varies in size, and may be situate on the surface just beneath the capsule, or in the substance of the organ. The general characters of these cysts are like those of Hydatids elsewhere. (*Vide* Hydatids of the Liver, page 43.)

The pressure caused by the cyst leads to atrophy and absorption of the renal substances.

The cysts may suppurate.

If the Hydatid bursts the contents may be discharged into the pelvis of the kidney, or into the stomach, intestines, or general cavity of the peritoneum.

3420. Half of a cystic kidney. One large smooth-walled cyst is seen in section, and close to this, but not communicating with it, is a second, somewhat smaller cyst. The cysts have replaced a considerable portion of the renal substance, projecting almost to the hilum. A small cyst, about the size of a pea, is seen in the base of the lowest pyramid, and two or three are seen on the surface of the organ. The kidney is otherwise apparently healthy. 6509

3421. A kidney in connection with the lower end of which is a large, rounded, smooth, and thin-walled cyst, measuring from 3½ to 4 inches in diameter. Four smaller cysts are seen projecting on the surface at the upper part of the specimen. If examined closely, numerous very minute cysts can be seen scattered through the cortical substance. 6511

3422. A right kidney, with a large serous cyst at the lower end, dried. The cyst involves the greater part of the kidney below the ureter. Its wall is thin, and branches of the renal vessels can be seen coursing over it. The cyst measures about 3½ inches in diameter, but was considerably larger in the recent state. At the top of the kidney near the margin are some smaller cysts. 2658

3423. A cystic kidney laid open. At the upper part of the specimen is a small piece of apparently unaltered kidney-substance. The rest of the organ is converted into a mass of cysts of varying size. The walls of some of these are thin, but of others considerably thicker. The capsule is thickened and tough, and the organ is enlarged. 6240

3424. Two cystic kidneys from the same patient. Both are very much enlarged, and no healthy renal substance can be seen. The organs consist of rounded thin-walled cysts of varying size. The contents in some cysts are pigmented. On the surface of section traces of kidney-substance, indurated, and riddled with small cysts can be seen. The adrenals are normal. 1890

Microscopic Examination.—The cysts are composed of a fibrous wall lined with epithelium. In some cases the cells have proliferated and partially filling the cysts give the section the appearance of one of glandular cancer.

History.—Mary Ann Saunders, æt. 53, was admitted under Mr. Beck on January 5th, 1890. About twelve years previously she had passed a considerable amount of bright blood in the urine; there were no clots, and Sir Henry Thompson said it was of renal origin. She had a similar, but less severe attack, lasting a week, four years ago. The general health had been good. Constipation was present on admission, and had gradually got worse for six months. There was vomiting after food since August 1889, increasing in frequency. For the same period the patient had been gradually emaciating, but there were no further symptoms. On admission palpation of the abdomen showed the presence in each loin of a large renal tumour, lobulated on the surface. The left tumour was much the larger of the two. There was slight abdominal pain, but no tenderness on palpation. There was no jaundice, but the skin was generally dark in colour, suggesting Addison's disease, although there was no localized increase in pigment commonly met with in that disease. The urine averaged thirty ounces in quantity during the day; specific gravity 1010; no blood or casts; a trace of albumen and 120 to 135 grains of urea daily. She was principally fed on milk, arrowroot, and Brand's essence. The patient rapidly lost strength, and died somewhat suddenly on January 11th. There were no convulsions or muscular twitchings, and no coma. Ten minutes before death she had listened with interest to a letter from her husband.

Post-mortem Examination.—The kidneys are preserved in the specimen, and part of the liver in No. 3425. The spleen contained a soft cheesy mass about the size of a hazel-nut. Microscopic examination of this showed a granular amorphous mass identical in appearance with the early changes described as seen in the liver. There was no hypertrophy of the left ventricle of the heart. One of the ovaries was cystic. The brain could not be examined, owing to the objections of the relatives. The other organs were normal.

Vide Mr. Beck's *Case-book*, 1890.

3425. Two slices of the liver from the same case as the preceding. The specimen is studded with cysts of varying size. In many cases the cysts are full of an opaque gelatinous material. The walls are thin and smooth. The liver-substance is healthy. In some parts of the liver small yellow nodules like caseating tubercles were found, and between these and the largest cysts, which contained clear fluid, all stages of the cystic change could be traced.

Microscopic Examination.—The cysts are apparently dilated bile-ducts, being composed of a thin fibrous wall lined in some cases with columnar epithelium. The contents are granular and homogeneous, probably representing degenerated cells. The liver-cells are granular and pigmented. There is no increase in the connective tissue.

3426. A portion of a cystic kidney. There is no trace of renal substance left, the whole organ being converted into a mass of cysts of varying sizes. Some of the cysts are round in outline, but many by mutual compression have been rendered polygonal. The walls are opaque and thickest in the largest cysts. 5437

History.—The patient was a gentleman, æt. 44, of temperate habits. His mother died, æt. 60, of cancer of the uterus. His father, brothers, and sisters were alive at the time of his decease. Two years before death there was severe renal hæmorrhage, which continued for several weeks, accompanied by dyspepsia and constipation. Five days before death the patient was seen by Dr. Bury, of Nottingham; he was then suffering from great abdominal pain, especially on the left side a little below the umbilicus. Palpation showed two large tumours in the abdomen. The right one was in the renal region, and the left extended from the crest of the ilium to a line on the level of the heart's apex-beat. The stomach was pushed upwards to the cardiac region, and the heart displaced to the right. The constipation increased, and at last there was complete obstruction. The patient died on March 18th, 1879. There was pericarditis with effusion. The renal function was well performed up to the last, the patient passing about three pints of limpid non-albuminous urine daily. At the post-mortem the left kidney was found to weigh nine pounds, the right about half that amount. Spleen small and contracted. The descending colon was empty, flat, and tape-like where it passed over the kidney.

3427. A similar specimen to the preceding, the disease being, however, in a less advanced stage. Traces of medullary substance can still be recognized, but minute cysts are scattered through it. The largest cysts are situated in the cortical portion and bases of the pyramids. 3727

History.—The patient was a man, æt. 46, who had been ill about nine months, when he died of pneumonia. Dr. Walshe thought he had Bright's disease. At the post-mortem both kidneys were found to be similarly affected, and weighed about eight ounces each. The fluid contained in the cysts gave a coagulum on boiling, and a precipitate with nitric acid and bichloride of mercury. Under the microscope round pigmented cells were found in the fluid.

Vide Dr. Walshe's *Case-books*, Males, vol. iii. 1848, "Charles Reid."

For Wax Model of Cystic Kidney, see page 148, *No.* 3630.

CONGENITAL CYSTIC DISEASE OF THE KIDNEYS.

Congenital cystic disease of the kidneys is frequently found in association with other abnormalities of development, but not necessarily so. The organ is frequently slightly enlarged, the ureter patent, and the substance of the kidney is riddled with small smooth-walled cysts (No. 3428). The cysts are retention-cysts, but there is a good deal of difference of opinion as to their precise origin.

According to some observers the cysts are dilatations of the tubules of the permanent kidney, while others regard them as arising in the tubular remains of the Wolffian body, which, owing to a want of differentiation between the meso- and meta-nephros, are mixed with the proper kidney-substance. If the latter view be correct, these cysts are analogous with some forms of ovarian cyst.

In cases of congenital cystic disease there is an increase in the consistency of the renal substance on account of an increase in the amount of connective tissue. The relation between this overgrowth and the cysts may be either that the connective tissue by pressure on the tubules produces the cysts, or that the presence of the cysts causes, by irritation, an increased growth of the interstitial substance.

The cysts contain urine, but this by no means proves that they originate in the permanent kidney tubules; for, as in fish and amphibia, the remains of the mesonephros may perform the functions of the permanent kidney, or, supposing the cysts to originate in the mesonephros, they might by pressure produce retention-cysts of the permanent renal structure, and so the cysts would be of two kinds, one of which would contain urine.

3428. Half of a cystic kidney from a full-term fœtus. The ureter is pervious and normal, as are also the renal pelvis and calyces. The surface of the organ is smooth, and presents trace of lobulation. The capsule separates without difficulty. The kidney measures three inches vertically by two inches in the horizontal direction. Its substance is riddled with cysts, varying in size up to ·8 cm. in diameter. The cystic condition is universal. The sites of the papillæ are in some cases occupied by cysts. There were no cysts in the liver, nor was there any other abnormality of the organs. The child was hydrocephalic. 6008

Microscopic Examination.—There is a considerable proportion of normal convoluted and collecting tubules, in microscopic sections, mingled with the dilated tubuli and cysts. The lining of the cysts is cubical or subcubical epithelium. The connective-tissue elements are concentric with the larger cysts. The connective tissue is considerably in excess; it is nowhere of marked density; its corpuscles are numerous, and its component fibrils easily recognizable.

The arterioles and glomeruli are perfectly healthy.

Vide Pathological Transactions, vol. xxxvii. 1886, p. 287.

BRIGHT'S DISEASE.

Acute Bright's disease may originate in connection with some other disease, notably scarlet fever, or may arise independently as a result of cold or other causes. In the early stages the kidney is swollen and deeply congested; the epithelium of the tubules proliferates and is granular and cloudy. Many of the tubes are filled with the inflammatory exudation which is washed out of them and passed in the urine as hyaline casts.

Later the kidney becomes paler than natural, partly from the fatty changes and partly from the exudation pressing on and obstructing the blood-vessels. This gives the kidney a mottled appearance, and the change becoming widespread the Large White Kidney is produced.

The epithelium soon undergoes fatty degeneration and is cast off. There is a slight increase in the amount of intertubular connective tissue. In some cases the large white kidney undergoes secondary atrophy after some time.

Chronic Bright's disease may follow on the acute condition, or may, especially in gouty and alcoholic patients, be chronic from the first. In well-marked cases the kidneys are much diminished in size, and on removal of the thickened capsule the surface is found to be granular (No. 3429) (Granular Contracted Kidney). The surface of the organ is usually torn in separating the adherent capsule. Small retention-cysts are frequently present in the cortical substance and are seen projecting on the surface (No. 3430). The colour of the kidney is in most cases not appreciably altered.

On section the organ is found to be tougher than natural, and the cortical substance much reduced in thickness, while the medullary is normal. The granular condition of the kidney is produced by unequal shrinking of the substance, and is analogous with the hob-nailed condition of the gin-drinker's liver. The connective tissue is considerably increased in quantity and by pressure leads to destruction of the tubules and their epithelial lining. The obstruction offered to the circulation leads to an increase in the thickness of the coats of the vessels and to hypertrophy of the left ventricle.

Albuminoid Kidney is met with in cases of long-continued suppuration with albuminoid degeneration of other organs. The kidney is usually enlarged, quite smooth on the surface, and of increased density. The cut surface is pale, and translucent in advanced cases, and the waxy material gives the characteristic brown colour when treated with iodine. The disease first attacks the Malpighian glomeruli and ultimately spreads to the small vessels. The epithelium is frequently fatty, the two forms of degeneration having a common cause.

The capsule is not thickened and separates readily.

3429. A kidney showing a granular condition of its surface. The organ is small, and where it can be made out the cortex is thinner than usual; the capsule has been removed without tearing the surface. 4061

Microscopic Examination.—The fibrous tissue of the kidney is considerably increased in amount, and the epithelium is granular and in many parts absent. The Malpighian glomeruli are albuminoid.

History.—The specimen is from a boy, æt. 17, who had had strumous disease of his tibiæ and ulnæ for seven years; associated with phthisis. Albuminuria and hemiplegia for 52 hours before death. In the recent state the parts between the granules on the surface of the kidney were deeply congested. The other kidney was similarly affected.

3430. An atrophied kidney, measuring 2½ inches in length by an inch transversely. The capsule has been removed, and a few collapsed cysts are seen on the surface. The pelvis is dilated. The specimen is probably from a case of chronic Bright's disease. 759

For Wax Models of Bright's Disease, see page 148, *Nos.* 3631 *to* 3634.

RENAL ABSCESS.

Suppurative inflammation of the kidney is most usually met with in cases of renal calculus (No. 3435); it also occurs as a secondary consequence of disease of the lower genito-urinary tract or may follow injury or the lodgment of an infective embolus. The suppuration may be confined to the proper kidney-substance (Suppurative Nephritis) or to the pelvis (Suppurative Pyelitis); but in many cases both conditions are combined (No. 3436).

Suppuration may also occur in the cellular tissue round the kidney (Perinephritic abscess). Pyæmic abscesses are distinguished by their number and relatively small size. In the condition known as Surgical Kidney the organ is deeply congested and acutely inflamed, the cut surface showing many scattered points of suppuration (No. 3437).

Abscess of the kidney, if it does not prove fatal, usually bursts into the pelvis, but may do so into the colon, or abdominal cavity, or may discharge itself through the loin. In some cases the fluid parts are absorbed, and the caseous material may undergo calcification.

(*Vide* Surgical Catalogue, Part II. p. 399.)

3435. A kidney showing areas of inflammation and suppuration of its substance consequent on calculous pyelitis. The pelvis is roughened by inflammation and a small piece of the stone is still present. The inflamed parts of the kidney-substance are recognized by their more spongy appearance. 3842

3436. Portion of a kidney from a case of calculous pyelitis. The outline of the kidney can be made out in the centre of the fatty mass in which it is embedded. Very little normal kidney-substance remains, the organ being riddled with abscesses, in one of which a calculus was found. The organ is surrounded and infiltrated by fat. 4720

History.—The specimen is from the left kidney of a boy, æt. 11. He had always been pale and delicate, and was said to have suffered from tabes mesenterica when two years old. Two years before death an abscess burst in the left loin, leaving one or two sinuses. He died of peritonitis and double pleurisy three weeks after an attack of scarlet fever.

Post-mortem Examination.—Right kidney enlarged, lobulated, deeply congested and easily lacerable. Left kidney closely attached to the psoas muscle and imbedded in fat. A sinus passed into the substance of the psoas and others opened externally through the loin. The sinuses communicated with the abscesses in the kidney. No trace of the ureter could be detected.

3437. A kidney laid open, showing the effects of inflammation dependent on obstruction of the ureter. The ureter and pelvis are dilated, the walls thickened and the mucous surface roughened by suppurative inflammation. The pyramids have been in great part destroyed by suppuration and pressure. On close examination numerous small inflammatory foci can be seen in the cortical and remains of the medullary substance. 757

The specimen is an example of "Surgical kidney."

3438. Half a kidney affected by syphilitic inflammation. At the upper end of the organ the substance is infiltrated with inflammatory material which has undergone central degeneration producing an irregular cavity. On the surface the affected area is indicated by its paler colour and more nodular surface. At the other end of the kidney a cyst is seen in section. 5478

For Wax Models of Suppuration of the Kidney, see page 149, *Nos.* 3635 *to* 3637.

TUBERCULAR DISEASE OF THE KIDNEY.

For descriptive heading see Surgical Catalogue, Part II. page 404.

3440. Half of an injected kidney from a case of miliary tuberculosis. On the surface of section, especially about the middle of the specimen, numerous small tubercle-nodules about the size of a pin's head can be seen. Some of these appear white as they are non-vascular. The surface of the kidney is rendered finely granular by the projection of these tubercular foci. 5442

3441. An enlarged kidney the seat of tuberculous disease. The pelvis is roughened and shaggy and the renal substance is infiltrated with yellow tubercular deposit. In some places this has softened and lead to destruction of the medullary portion of the organ. The disease has extended down the ureter, the walls of which are thickened, and the mucous membrane ulcerated. 2368

3442. Two tubercular kidneys. In the larger organ the pyramids are extensively destroyed, being replaced by ragged cavities communicating with the diseased pelvis. The cortical substance is unaffected. In the smaller specimen the changes are similar in nature but more advanced; the disease has spread to the cortex. 4792

History.—The patient was an old man who had been long subject to urinary trouble, occasionally producing great pain. Before death the amount of urine was much diminished, and it was scanty and high-coloured. The patient sank gradually. At the post-mortem the bladder was found to be "much diseased."

3443. A tubercular kidney laid open to show the yellow caseous material filling the dilated pelvis and calyces and replacing the pyramids. The capsule is thickened, and there is hardly a trace of renal substance left. 2284

3444. Half of a kidney from a patient who died of spinal caries with lumbar abscess. To the naked eye there is no trace of kidney-substance, the organ being converted into a multilocular sac, which during life contained caseous pus (Pyonephrosis). The loculi correspond accurately with the Malpighian pyramids. The capsule is thickened, and the organ lobulated. The kidney is very small. 5491

3445. The other half of the preceding specimen, showing the mortar-like material filling the cavities. 5491

3446. Half of a lobulated kidney the seat of tubercular disease. The surface of section presents numerous irregular cavities, some of which communicate while others remain distinct. Various stages of the process are seen at different parts; in some of the affected areas degeneration has only advanced slightly. The renal substance is denser than natural and traversed by dense white fibrous tissue. 5566

3447. A tubercular kidney. Very little renal substance remains, the entire medullary substance having been destroyed by tubercle, which undergoing degeneration has produced large abscess-cavities communicating with the pelvis. The interior of the abscesses is rugose and the tuberculous matter at their margins projects beyond the level of the surrounding kidney-substance. The organ is enlarged and its surface nodular. 4220

History.—The patient was a male, æt. 19, who died of peritonitis. The mucous membrane of the bladder was ulcerated in several spots and was mottled in appearance from pigmentation. The ulceration had led to the formation of a recto-vesical fistula, and the rectum was itself the seat of ulceration. Ten years before death the patient had had a stone removed from his bladder by Mr. Quain, and during the latter three or four months of life symptoms returned but no stone was found.

Vide Mr. Quain's *Case-books* 1844 and 1856.

3448. A kidney which is rendered almost unrecognizable by tubercular disease. A little cortex is all that remains of secreting substance. The medullary portion has been completely destroyed by tubercular disease. In the situation of the pyramids are large tuberculous cavities with rough walls. 5388

For Wax Model of Tubercular disease of the Kidneys, see page 149, *No.* 3638.

TUMOURS OF THE KIDNEY.

Malignant Tumours. Cancer and Sarcoma.—These growths may be primary or secondary. Primary growths are not infrequently met with in quite young children.

Cancer occurs as the soft glandular or encephaloid variety, and originates in the epithelium lining the tubules. Malignant growths may occur as isolated nodules, causing irregularities on the surface, or may infiltrate the whole organ, which is much enlarged.

The growths are usually very vascular, and tend to undergo extensive degeneration. Extravasations are common (No. 3449). The consistency is soft, especially when degeneration of the cells is advanced. The growth may extend into and block up the pelvis and ureter, and the cancerous organ is bound down to the neighbouring parts. In advanced cases there is very little trace of renal substance remaining.

For further information and specimens, vide Surgical Catalogue, Part II. p. 403.

Fibro-Myomata.—Small rounded tumours, composed of fibrous tissue with striated muscle-fibres, are not uncommon in the kidney. They are pale in colour, quite circumscribed, encapsuled, and of no clinical importance.

3449. Half a kidney, which is much enlarged by the growth of a malignant tumour. The renal substance can be plainly recognized, stretched over the new growth, and more or less atrophied. The tumour is broken down by a large hæmorrhage into its substance. A large mass of glands, secondarily involved, are attached to the kidney: the growth has fungated through the capsule at one part. 2270

Microscopic Examination proves the growth to be a small, round-celled sarcoma.

3450. A kidney involved by a sarcomatous growth. The kidney is seen at the lower part of the specimen. It is surrounded at the upper part by a mass of new growth, which involves its substance. The tumour is firm in consistency, of a whitish colour, and composed of rounded nodules separated from one another by well-defined fibrous septa. 5457

Microscopic Examination.—The growth is composed of small round cells with a small amount of fibrous stroma.

3451. A specimen of malignant disease of the kidney. The organ is considerably enlarged, and the cut surface is of moderate consistency and has lost all the appearances of kidney-tissue. The growth is divided into lobules by the thickened septa of the kidney. At one end it is degenerated. 2120

Microscopic Examination.—The growth is composed of delicate branching processes of connective tissue covered with columnar epithelium. In the deeper parts columnar epithelium cells are lying in rounded and oval alveolar spaces in the connective-tissue stroma. There is no history to the specimen. Its microscopic characters are precisely similar to those of the villous or duct-cancer of the breast.

For Wax Models of Tumours of the Kidney, see page 149, *Nos.* 3639, 3640.

Series LII.—DISEASES OF THE BRAIN AND ITS MEMBRANES.

Meningitis.

Inflammation of the cerebral membranes arising independently of tubercle may be secondary to fractures of the skull, with or without injury to the dura mater (No. 3460), or may occur in consequence of necrosis of the bones of the skull or in the neighbourhood of a tumour. The vessels are intensely injected, and there is a large amount of serous effusion, which may ultimately become purulent. The effusion distends the cerebral ventricles, giving rise to the condition sometimes spoken of as Inflammatory Hydrocephalus. In the early stages the exudation renders the brain softer than natural, but later on the pressure it exerts flattens the convolutions, and squeezes out the subarachnoid fluid, so that the surface is dry and sticky. Should suppuration occur the case terminates fatally, but otherwise the fluid exudation may become wholly or partially reabsorbed. If the absorption is incomplete, chronic hydrocephalus results. The membranes are usually left somewhat thickened and opaque, and should this occur round the nerves they may be so compressed as to undergo atrophy and lose their function. Meningitis may cause inflammation of the brain-substance or the cranial nerves. Optic neuritis is usually present, and cerebral abscess may occur. Minute extravasations of blood are not uncommon.

Meningitis of an infective nature may result from chronic disease of the middle ear, from pyæmia, or any of the acute infective diseases. The pathology is identical in its main characteristics with that just described; but it must be borne in mind that as the disease is due to a poison, it is likely to end in suppuration and death.

Tubercular meningitis, *vide* page 118.

3460. The greater part of the dura mater lining the vertex, showing the effects of inflammation following injury. On the outer surface three small areæ can be seen, two on the right, and one on the left side; these show superficial erosion, and one of them is coated with flakes of lymph: they were probably contiguous to local disease of the skull. The inner surface of the dura is much more extensively affected than the outer, being dull and opaque throughout, and covered by a thin layer of lymph. The longitudinal sinus is normal. The inflammation has probably extended by continuity from without, and it is important to note the wide extension of the inflammation on the inner surface, although the outer was in immediate contact with the seat of the original injury. 2206

Hydrocephalus.

The ventricles of the brain may become distended with fluid, owing to obstruction of the iter either from inflammatory changes or as the result of pressure by a tumour; in other cases it results from occlusion of the veins of Galen.

Dropsy may also result in the brain as elsewhere from an increase in the amount of fluid without any obstruction: this is specially seen in the ventricles in cases of tumour and tubercle (No. 3490).

It must be borne in mind in examining specimens of dilated ventricles that the primary condition may have been an atrophy of the cerebral substance, such as occurs in advancing age and in the brains of idiots and madmen. As a consequence of the wasting of the cerebral tissues the space becomes filled with subarachnoid fluid.

Finally, the condition may be congenital, and is then not infrequently associated with spina bifida.

The fluid in hydrocephalus is different in some respects from ordinary cerebrospinal fluid; the specific gravity is higher, and it contains albumen and urea in addition to sodium chloride.

Should the accumulation of fluid take place to any extent, the brain-substance undergoes atrophy from constant pressure; the sulci are rendered more shallow, and the convolutions become flattened out. The foramen of Monro and the iter may be enormously enlarged. In Congenital Hydrocephalus the skull assumes a characteristic appearance.

3465. The pons and medulla, with the third ventricle of the brain, which has been dilated. The tuber cinereum in the floor of the third ventricle is greatly distended and reduced to a thin membranous pouch. The optic tracts and commissure are flattened out. Owing to the distension of the tuber cinereum the corpora albicantia seem as if displaced backwards. Within the third ventricle the soft commissure is seen to be stretched and torn. The cause of this distension may be occlusion of the iter; its effects are most marked in the floor of the ventricle, since this is the direction of least resistance. 2684

HÆMORRHAGE.—APOPLEXY.

An extravasation of blood may occur either as the result of injury (No. 3469) (*vide* Surgical Catalogue, Nos. 131, 132, 133, and 135), or spontaneously from the rupture of a diseased vessel. Extensive apoplexies usually occur as the result of rupture of a small aneurysm, situate in the course of one of the basal arteries, or the vessel may give way simply on account of weakening of its walls by inflammation or fatty degeneration, without the formation of an aneurysmal sac. Increased tension, as met with in gouty kidney and hypertrophy of the heart, cannot of itself cause rupture of an otherwise healthy vessel; but in such cases the walls are usually diseased. Should softening occur in the neighbourhood of a diseased vessel, extensive apoplexy may ensue, since the already weakened vessel loses the natural support of the surrounding structures.

Capillary hæmorrhages are not uncommon as the result of occlusion of some of the sinuses or large veins (No. 3483), and frequently occur in encephalitis and meningitis. These minute extravasations are often very wide-spread, and appear as small dots over the surface of the brain; at other times punctæ coalesce and form large areas of hæmorrhage under the pia-arachnoid. The hæmorrhages may be actually in the brain-substance, or may be limited to the vascular sheath. The same effects may ensue as the result of congestion caused by the growth of a large tumour.

Spontaneous extensive apoplexies occur most frequently in the neighbourhood of the corpus striatum or optic thalamus, most rarely in the upper part of the cerebral hemispheres. This is due to the fact that the so-called basal system of arteries are subjected to higher pressure, and have to bear the full force of the blood-current; this fact would especially predispose them to atheroma and aneurysm, and the vessels being diseased would determine their rupture.

The basal system of arteries consists of vessels derived from the anterior, middle, and posterior cerebrals. These supply the central ganglia. The middle cerebral feeds the largest area; its branches form two groups, an anterior set called lenticulo-striate, and a posterior or lenticulo-optic. One of the anterior set, larger than the rest, penetrates the outer segment of the lenticular nucleus, and crosses the internal capsule to the caudate nucleus; this has been called by Charcot, the artery of cerebral hæmorrhages, as it is the most frequent source of large apoplexies (No. 3471).

The size of an apoplectic clot necessarily varies with the size of the ruptured vessel; it may be so extensive as to destroy large tracts of brain-substance, and entirely fill the ventricles.

The blood when first poured out forms a soft coagulum like red-currant jelly, the brain-substance is ploughed up by the hæmorrhage, the fibres ruptured and destroyed; the clot presses on the surrounding parts and ex-sanguinates them in greater or less degree: the obstruction thus caused may produce capillary hæmorrhage in the surrounding brain-substance.

In some cases the blood effused alternates with layers of apparently healthy brain-substance, giving the whole mass a stratified appearance on section. Very soon the clot contracts, and the serum is squeezed out and absorbed by the lymphatics, and consequently the pressure exercised by the clot is lessened ; this accounts for the fact that at first a patient may recover from the effects of apoplexy with some rapidity, but since some of its effects are due to the destruction of the nervous substance and some to the solid clot remaining, the rapid partial recovery comes to a standstill.

Later on, as the clot consolidates, the hæmoglobin undergoes changes, and the coagulum becomes of a lighter colour, the surrounding parts assume a yellowish tinge like that seen in a subcutaneous bruise (No. 3470). Finally, the clot may disintegrate, and becoming absorbed, the surrounding parts contract, and form a cicatrix ; more rarely the space left is filled with serous fluid constituting an apoplectic cyst (Nos. 3467, 3470, and 3471). The surrounding parts are indurated by chronic inflammation, causing an overgrowth of neuroglia (No. 3470).

3466. The medulla and pons, with part of the right half of the cerebellum, from a patient who died of apoplexy. There has been an extensive extravasation of blood at the base of the brain. The clot covers the under surface of the parts preserved in the specimen, but does not extend into the fourth ventricle. The effusion, judging from its size, probably came from a large vessel, and took place under considerable pressure, since the clot is accurately moulded to the parts at the base of the brain. 442

3467. The right half of the cerebrum, showing an old apoplectic clot occupying the posterior third of the corpus callosum and adjacent part of the gyrus fornicatus. The clot overhangs and partly occupies the posterior cornu of the lateral ventricle, and is covered by the superior parietal lobule, in which situation the brain is extensively softened. It is about the size of a duck's egg, and is divisible into three parts, anterior, middle, and posterior. Of these the anterior has been converted into a cyst, with firm fibrous outer wall lined internally by shreddy brown laminæ ; the middle portion is wedge-shaped, and consists of compact clot, over the lower part of which the cyst-wall is continued ; the posterior part shows invasion of brain-substance by blood, without definite limitation. The extent of the apoplexy towards the middle line is not stated in the MS. Catalogue, nor is any mention made of its relation to the veins of Galen. Both lateral ventricles were much dilated, and the specimen shows flattening of the corpus striatum ; the middle part of the lateral ventricle has been extensively denuded of its ependyma. Microscopic examination of the central portion of the clot shows it to consist of densely packed red cells. 1262

History.—The specimen is from a woman, æt. 26, who, three years before death, suffered from epileptiform attacks, followed two years later by strabismus, blindness of the right, and subsequently of the left eye. The history is that of cerebral tumour.

3468. The right hemisphere of a brain divided into three portions transversely. There is an extravasation of blood into the inferior temporo-sphenoidal region. The hæmorrhage is most extensive in the grey matter. The piece of dura mater is covered with clot on its cerebral surface.

3469. Three transverse sections of the pons, showing hæmorrhage into its substance. In the upper section the clot is seen to be close beneath the posterior surface, a little to the left of the middle line. In the middle section the clot is about $\frac{1}{8}$ inch below the iter ; near the upper surface are several small points of extravasation. Similar appearances are observable in the lowest specimen. The hæmorrhages are readily recognized by their dark brown colour. It is noticeable that the smaller extravasations are circular in outline, the larger ones linear ; this is simply the result of the disposition of the fibres of the pons. 5510

History.—The patient, a man, æt. 45, was found lying at the bottom of a flight of twelve stone steps ; he was unconscious, and there was a small wound near the right parietal eminence. The pupils were contracted but equal. The pulse irregular, and varying from 90-112. Respirations 30. The muscles were general flaccid, but there was no obvious paralysis. Death occurred 2½ hours after admission to the hospital.

Post-mortem Examination.—There was a fracture of the middle and anterior fossæ, with rupture of the right middle meningeal artery, and a large clot under the dura mater covering each hemisphere. The temporo-sphenoidal and frontal lobes, especially on the left side, were lacerated. There was also a hæmorrhage into the floor of the fourth ventricle and into the pons.

The specimen is of great interest from a medico-legal point of view; that most of the damage was caused by the fall is undoubted, but whether or not the fall was due to a primary hæmorrhage into the pons and medulla is very questionable.

Vide Surgical Registrar's Report, U. C. H. 1880, p. 59.

3470. The right frontal lobe of the brain, showing a blood-cyst lying anteriorly just beneath the convolutions, which are slightly depressed over it. It is about the size of a marble, and of an irregularly rounded shape. A smooth membrane lines the cavity, and is connected with the brain-substance by loose connective tissue, which, superficially over the depressed area mentioned, seems to have in great measure replaced the proper brain-substance. On the inner wall and in the loose connective tissue patches of a brownish-yellow colour are seen; these are altered blood-pigment, and indicate the hæmorrhagic nature of the lesion. The disappearance of the brain-tissue superficially indicates that the original extravasation had so far interfered with the blood-supply and consequent nutrition of the part as to lead to its necrosis and absorption, with subsequent replacement by granulation or scar-tissue. 2246

3471. Part of the frontal and temporo-sphenoidal lobes of the right side of the brain, showing a blood-cyst situated just beneath the convolutions of the island of Reil. It occupies the position of the claustrum, external capsule, outer and posterior half of the ventricular nucleus, and invades slightly the internal capsule at its posterior part. The cyst resembles in size and shape the suprarenal capsule, and is lined by a smooth membrane of a mottled rust-colour. The surrounding brain-substance is apparently normal. From the general appearance of the specimen it is clear that the lesion was not immediately fatal, but was followed by absorption and organization of the blood-clot. The hæmorrhage must have resulted from rupture of one of the striate branches of the middle cerebral artery, which, piercing the locus perforatus anticus, ramify over the outer lenticular nucleus. The present lesion is characteristic in its position, and must have given rise to left hemiplegia, and possibly, from its also invading to a slight extent the posterior division of the internal capsule, to some degree of hemianæsthesia. 4068

3472. Two cysts which were removed from the brain, but the exact position of them and whether or not they were actually in the substance of the brain is not stated in the MS. Catalogue. The larger cyst measures rather over 1½ inches in its longest diameter; its wall is formed of fibrous tissue, and lining it is a pale brownish shreddy substance easily peeled off from the capsule—this is altered blood-clot. The smaller cyst is attached to the outer wall of the one just described: the cavities of the two do not communicate with one another. The smaller cyst is almost quite full of altered blood-clot. It is probable that these cysts are formed as the result of hæmorrhage, the blood having set up a chronic inflammation leading to organization, and hence the cyst wall. The peripheral portions of the effused blood coagulated, but probably the central part never became solid, as is commonly seen in cases of hæmatocele of the tunica vaginalis testis. The usual seat of these sanguineous cysts is the arachnoid; they are commonly known as subdural blood-cysts. 1087

3473. A specimen of subarachnoid hæmorrhage at the base of the brain. The extravasation is most abundant over the left temporo-sphenoidal and occipital lobes, but is present over the adjacent upper surface of the cerebellum and slightly over the left temporo-sphenoidal and occipital lobes. 6536

The specimen is from a still-born child, which presented by the face.

3474. The right half of a brain, showing subarachnoid hæmorrhage over the temporo-sphenoidal and occipital lobes, and to a less extent over the cerebellum. The membranes over the rest of the hemisphere are deeply congested. 6532

The specimen is from a premature child between six and seven months' gestation. It died twenty-six hours after birth. The hæmorrhage was due to difficult labour.

CEREBRAL ANEURYSM AND VARIX.

Aneurysm of the intracranial vessels is most commonly met with in the basilar (No. 3475), anterior and middle cerebrals, and internal carotid. They are usually spherical in shape, affecting the whole lumen of the vessel, and may attain considerable size. The smaller vessels are often the seat of numerous miliary aneurysms, the rupture of which is a frequent cause of extensive apoplexy.. Aneurysms in the cranial cavity are due to the same causes as those arising in other parts; but it is noteworthy that an aneurysm in a young adult is more frequently in the brain than elsewhere. Cerebral aneurysms may terminate fatally by rupture, or may induce softening from occlusion of the vessels; they will also, if large enough, necessarily produce the symptoms and effects common to all tumours.

For an account of the general pathology of Aneurysm *vide* Catalogue of Surgical Pathology, vol. i. p. 252, and for special reference to Intracranial Aneurysm, p. 266.

In rare cases the veins of the central nervous system become varicose and may form very distinct bunches of vessels. They are most commonly met with in the veins of the pia mater of the cord.

3475. The vertebrals and basilar artery from a man who died of contracted kidney. The posterior half of the basilar artery is the seat of a fusiform aneurysm, part of the wall of which has been removed to expose the interior. There is no coagulum, the walls of the vessel are thickened by endarteritis, but the lining membrane is smooth. The right vertebral is dilated. The walls of the arteries are thickened and opaque, but there is no evidence of ossification; here and there they are slightly beaded. 6053

For Wax Model, vide page 151, *No.* 3468.

CEREBRAL THROMBOSIS AND EMBOLISM.

Thrombosis, unless associated with inflammatory affections of the brain or membranes, is not commmonly seen in the vessels of the brain. It may occur, however, as the result of some disease of the vessel-wall, especially syphilitic endaretritis. The cortical veins may become thrombosed from partial or complete obliteration of their lumen by the pressure of tumours, and very frequently in cases of meningitis as the result of cerebral phlebitis.

Thrombi in the vessels of the brain may undergo the changes common to those seen elsewhere—*vide* Catalogue of Surgical Pathology, Part I. p. 280.

The obliteration of the vessel is frequently accompanied by degeneration of the parts supplied by it (Nos. 3480 post-mortem and 3482). At other times the obstruction offered to the circulation produces extensive capillary extravasations (No. 3483).

Embolism is most commonly met with in the left middle cerebral (No. 3482), but may occur in the vertebrals, basilar, or any other vessel; the seat of its impaction will depend partly on its origin and partly on its size. The emboli may be of an infective nature, and it is usual then to find many of them and for abscess to result.

The impaction of an embolus may be rapidly fatal, depending mainly upon its seat and the area of brain-substance thus suddenly deprived of its blood-supply, or it may induce degenerative changes in the brain (No. 3482).

Cerebral aneurysm in rare cases forms behind the obstruction caused by an embolus, or extensive capillary hæmorrhages may result.

3480. A specimen showing clotting in the middle cerebral artery extending into some of its branches. The clot occupies the main trunk of the vessel from its origin up to its point of division. The clot has been accidentally detached from the middle portion of the artery. In the distal portion of the embolus there are evidences of canalization, *i. e.* whilst the periphery shows a laminated character the central part is undergoing disintegration. 5044

History.—The patient, a man æt. 30, was admitted under Sir William Jenner's care January 29th, 1870. While walking he had, without any warning, fallen down insensible. On admission there was complete right-sided hemiplegia with aphasia; he seemed to understand what was said to him, but answered "yes" to all questions. There was no rigidity; sensation was present to some extent. There was a systolic apex murmur. Subsequently the hemiplegia and aphasia slightly improved. In March there was commencing white atrophy of the left optic disc; bed-sores developed, and there was œdema of all the limbs; the liver was considerably enlarged; and the patient died on March 31st.

Post-mortem Examination.—There was a patch of cortical softening at the junction of the middle and posterior lobes. The softened area measured 2¼ inches by an inch; over this area the pia arachnoid was adherent. The left corpus striatum was decidedly smaller than the right; this was especially well noticed behind, and the substance here was softened and of a yellowish-white colour. The left middle cerebral artery was plugged with clot; the walls of the vessel were apparently healthy.

The right side of the heart was much distended, the right auricular appendix was filled with an old clot. There was a polypoid mass in the apex of the left ventricle; this was about the size of a hazel-nut and showed signs of softening in the centre. The mitral valve was roughened and calcareous and was coated with fibrine. In the lungs were numerous infarcts, the base of the right one being almost solid. There were also infarcts in the kidneys and spleen. There was double pleural effusion, and a nutmeg-liver.

During life there was occasional hæmoptysis and dyspnœa, probably due to the pulmonary infarcts; also albuminuria at times, perhaps due to the renal infarcts. The optic atrophy on the left side may have been dependent on embolism of the central artery, but no mention is made of this in the notes of the case.

3481. The vessels forming the circle of Willis with the basilar and vertebral arteries, most of them having been laid open. A clot completely fills the basilar artery. The walls of the vertebrals, basilar, and posterior cerebral are abnormally firm, in parts being almost cartilaginous in structure, the intima especially being thickened. This thickening has led at certain parts to considerable narrowing of the calibre of the vessel. These changes are well seen at the junction of the vertebrals and in these vessels themselves. 5915

History.—The patient, a man æt. 40, was admitted to the Cardiff Infirmary two days after the onset of symptoms. Death occurred fourteen days later. The onset of the symptoms was gradual without any initial loss of consciousness; unconsciousness only supervened two or three days before death, when it was accompanied by complete paralysis and coma. On admission he complained of pain in the occipital region; there was absolute aphasia with paralysis of the right arm and leg with heightened temperature on this side. There was incontinence of fæces and retention of urine. There was a well-marked history of syphilis.

At the *post-mortem examination* the vessels of the brain were found to be generally thickened; there was softening of the left upper half of the pons, extending slightly downwards into the lower half of the same side and a little way over to the right. Brain otherwise healthy. The microscope showed well-marked fatty degeneration of the pons with small-celled infiltration. The systemic vessels were thickened, but the viscera were healthy.

3482. Part of the left cerebral hemisphere with the left middle cerebral artery, which has become occluded by a blood-clot, leading to secondary softening of the parts supplied by it. The walls of the vessels appear thickened and are tortuous, having a beaded appearance; these changes are probably the result of syphilis. The blocking of the vessels extends to the primary and secondary branches of the main trunk and completely fills their lumen. The area of softening corresponds with the under half of the third frontal convolution (Broca's) in its entire length and to the lower end of the ascending frontal. Over the softened area the smooth surface and definite outline of the convolutions is lost, and the brain-substance is of a yellowish tinge and pulpy consistence. On cross section, the softening has been found to have involved the entire thickness of the grey matter and to have extended into the white beneath. The specimen illustrates the essential cortical lesion in aphasia, viz. damage to the hinder end of the third left frontal convolution; this with the base of the ascending frontal includes the oro-lingual motor centres of Ferrier. In the MS. Catalogue the specimen is described as being one of Cerebral Embolism, but no history of it is appended. It is quite possible that it may be the result of Syphilitic Thrombosis. 5037

3483. Portions of the left hemisphere of a brain. In the larger piece the veins over the upper frontal and parietal lobes are thrombosed; the thrombosis extended to the superior longitudinal sinus, which contained pale clot. Along the course of the veins the surface is mottled from congestion and extravasation. The cut surface of both portions shows congestion and extravasation into the cerebral substance, which was softer than natural. There was an excess of serum beneath the arachnoid, and the pia mater was congested. The other parts of the brain were pale but otherwise normal. 6478 A

The patient had right-sided hemiplegia, coming on six days before death. For history of the case *vide* No. 3399.

For Wax Models, vide page 151, *Nos.* 3649 *to* 3653.

Cerebral Abscess.

Abscess of the brain, more common in the white than in the grey matter, may occur as the result of a purulent meningitis or may be the primary lesion in the brain.

It may be due to laceration or contusion of the brain from injury, especially in compound fractures (No. 3486): in these the blood poured out at the time of the accident may become septic and set up meningo-encephalitis, resulting in abscess. Emboli, especially if infective, frequently cause cerebral abscess, often of large size.

One of the most common causes is undoubtedly suppurative disease of the middle ear; this may produce the cerebral lesion either by direct extension consequent on caries of the roof of the tympanum, or by what has been called Retrograde Phlebitis; the veins become inflamed and filled with clot, often infective. In these cases the abscess is usually formed in the centre of the temporo-sphenoidal lobe, and the tissues between it and the middle ear do not show evidence of active disease.

In the first stages of the formation of an abscess in the brain the vessels are engorged, and capillary hæmorrhages are seen in their neighbouroood, the blood-pigment undergoes decomposition, and consequently the substance round is often mottled in appearance, being of a yellowish or brownish tint (No. 3484).

The nervous substance is swollen by the exudation. The abscess-wall is shreddy, soft, and pulpy (No. 3485), and in chronic cases may be surrounded by inflammatory new tissue.

The surface of the brain is frequently flattened and sticky, and if the abscess is quite superficial the membranes become inflamed and adhere to the surface.

Finally, the abscess may terminate fatally without bursting, or it may burst in the ventricles (No. 3487) or outside the brain. The gravity necessarily depends upon the situation and size of the abscess.

Cerebral abscess is most commonly seen in the hemispheres, especially the temporo-sphenoidal region (No. 3484), next in frequency in the cerebellum. Abscess of the spinal cord is very rare. Sometimes several abscesses may occur and then they are due to the impaction of infective emboli forming part of a general pyæmic process.

If the pus is evacuated by surgical interference the abscess-cavity will contract and become filled with scar-tissue, as is the case in the healing of an abscess in any of the soft structures.

In very rare cases it is said that cerebral abscess may become caseous and encapsuled, doing the patient no harm.

3484. The right half of the brain, showing an abscess-cavity situate in the middle third of the under surface of the temporo-sphenoidal lobe. The outline is rounded and measures about two inches in its greatest diameter. Internally it is smooth in outline, but the walls have a granular appearance. The neighbouring brain-substance is of a brownish colour and somewhat friable. The wall of the abscess is tough and leathery and about half a line in thickness at its under aspect. The pia-arachnoid on the convex surface is thickened and slightly more opaque than usual. 6167

3485. Portion of one of the cerebral hemispheres in which an abscess has formed. The abscess has tunnelled in various directions, producing an irregular branching cavity situate in the white matter beneath the convolutions. One diverticulum extends close up to the surface of the brain; at this spot the dura mater is adherent and a good deal thickened. The outer surface of the membrane is roughened, showing that it was adherent to the bone. The inner surface of the abscess-cavity and the brain-substance immediately adjacent are soft and pulpy, and quite at the margins semitranslucent in places. In the absence of history it is impossible to say whether the abscess arose in the substance of the brain from some unknown cause, or whether it was the result of extension from disease of the bone corresponding to the roughened area of the dura mater. 401 I

3486. A photograph of a brain showing destruction of the whole of the temporo-sphenoidal lobe and part of the frontal and occipital lobes on the right side in consequence of suppuration following a bullet-wound of the internal ear.

History.—During the development of the abscess the temperature was normal and the pulse between 65 and 70. There was severe headache, followed by delirium and coma. There were twitchings and paralysis of the left upper and lower limbs.

The specimen is preserved in the Army Medical Museum, Washington, U.S., No. 6909.

3487. A photograph of the brain from a case of abscess of the right frontal lobe, which burst into the lateral ventricle. The right hemisphere bulges over to the opposite side.

The specimen is preserved in the Army Medical Museum, Washington, U.S., No. 3571.

Tubercle of the Brain.—Tubercular Meningitis.

Tuberculosis of the central nervous system may occur as a primary manifestation of the disease, or secondarily to a similar affection of some other organ. In the latter case it is probably, in some instances at least, the result of embolism, and occurs as disseminated tubercle with rapidly fatal results. In the membranes tubercle is most evident in the pia mater (Nos. 3497 and 3498), but is not rarely seen on the inner aspect of the cranial and spinal dura mater (Nos. 3495 and 3496).

Crude tubercle generally occurs in the vascular grey matter of the cortex or central ganglia (No. 3489), more rarely in the less vascular white matter. The nodules are usually surrounded by brain-substance (No. 3489), but are sometimes found close beneath the surface, connected with the pia-arachnoid (No. 3488): this is frequently seen in the cerebellum. When thus superficially situated, they often excite a localized meningitis, which may not be tubercular in nature, and may lead to the formation of adhesions with the dura mater (No. 3492), or may give rise to considerable exudation of sero-purulent or purulent material.

Conglomerate tubercle occurs most frequently in the cerebellum, and the spherical or tuberous masses attain their largest size in this situation (No. 3491).

If the tubercle be in active growth, a delicate pinkish or reddish lamina is found surrounding a yellowish central core of more or less homogeneous appearance, sometimes distinctly laminated. In this investing membrane miliary tubercles are developed and, undergoing caseous degeneration, they blend with the central mass. Softening frequently, and calcification occasionally, occurs.

The pons Varolii is sometimes the seat of crude tubercle (No. 3490), the masses being embedded in its substance or projecting on its surface anteriorly or posteriorly. In the latter cases they may form polypoid masses in the fourth ventricle. The central tracts of the medulla and cord are rarely affected.

When tubercle attacks the cerebral pia-arachnoid it is found in greatest abundance along the course of the small vessels at the base of the brain, in the neighbourhood of the Sylvian fissure (Nos. 3493 and 3497). It is usually bilateral. The disease subsequently spreads along the vessels to the upper surface of the hemispheres, and to the brain-substance and nerves, causing degeneration of the nerve-elements. The tubercles, at first small and possibly few in number, become more numerous, and adjacent nodules coalesce, forming larger masses of caseous material, usually surrounded by discrete tubercular foci. Should the tubercular mass attain a large size and be single, it will produce the symptoms of cerebral tumour. The disease originates in the lymphatic sheaths of the vessels and in the external coat, but later on spreads to the middle and inner coats and obliterates the lumen of the vessel. It may spread along the great transverse fissure and affect the choroid plexuses of the ventricles.

3488. The medulla and pons with the cerebellum, embedded in the upper surface of which are three small tuberculous masses. There is a fourth just in front of the anterior border of the cerebellar commissure; this mass is situated in the pia-arachnoid probably of the velum interpositum, and does not invade the subjacent brain-substance. The posterior tumour, which has been turned out of its bed, has a small piece of dura mater attached to it. A small mass is situate close to the iter involving the left crus cerebri and corpora quadrigemina. 2113

3489. The medulla and pons with the right half of the cerebellum; a section has been carried obliquely through this exposing the corpus dentatum. A tubercular mass, the size of a small pea, is seen in connection with the margin of the grey nucleus. It presents the usual characters of crude tubercle, undergoing central softening. On close examination it is found to be invested with a firm fibrous capsule. Symptomatically the mass is insignificant, owing to its small size, but the specimen is of interest as showing the tendency of tubercle to originate in connection with grey matter. 537

3490. The pons and medulla of a boy who died of tubercular meningitis. Two globular masses the size of large marbles are situated at the upper border of the pons in the thickness of the crura and corpora quadrigemina. Both masses have been almost completely enucleated from their bed. The ragged appearance of the pons and medulla is due to the presence of the membranes which have been imperfectly removed; they appear thickened, and flakes of lymph are adherent to their outer surface; where they have been peeled from the brain-matter, the pons and medulla look roughened and irregular. The tubercular masses would almost necessarily cause blocking of the iter, and so produce hydrocephalus, which was, indeed, present. Tubercular masses were also found in the cerebellum (No. 3491). 437

3491. Three sections of the cerebellum showing masses of crude tubercle embedded in its substance. Some of the masses are deeply placed, others superficially, just beneath the pia-arachnoid, but these do not project above the normal level of the brain. The masses are nearly spherical in outline and circumscribed; the cut surface is homogeneous, without any trace of central softening or calcification. The surrounding brain-substance is apparently unaltered. From the same case as the preceding. 438

3492. A small piece of the cerebral cortex showing adhesion between the dura mater and the arachnoid membrane. The precise nature of the condition is uncertain, but it is probable that it has resulted from the cicatrization of a tubercular nodule originating in the pia mater, and subsequently affecting the dura mater. 3756

3493. The brain of a child who died of tubercular meningitis: the hemispheres have been partly removed in order to show the interior of the ventricles. The morbid changes are evident at the base. There is slight opacity of the tips of the temporo-sphenoidal lobes, but the main stress of the disease has fallen on the middle and posterior parts of the brain. The membranes over the pons and medulla are thickened and matted, and this condition also extends forwards to the optic chiasma and roots of the olfactory nerve, and into the commencement of the Sylvian fissure, outwards from the medulla to the flocculus on each side and thence over the cerebellum. The subarachnoid space between the medulla and cerebellum is distended, and the arachnoid itself thickened; its torn edge corresponds with the line of adhesion close to the foramen of Majendie, which must have cut off this space from the general subarachnoid cavity of the cord. The foramen of Majendie is patent. The third, fourth, and lateral ventricles are distended, and the fluid contained in them was slightly turbid. There was no other visceral lesion discovered at the post-mortem. There was craniotabes and slight thickening of the orbital plates of the frontal. The limb-bones and ribs were not rickety. 5529

History.—The child, æt. 5 months, was admitted into University College Hospital in a state of semi-unconsciousness; the head was retracted, and there was some arching of the back with rigidity of the limbs. There was marked strabismus and cerebral breathing: pupils equal and of medium size. There was an occasional cry. Temperature 102°-103°·6. The body was covered with an erythematous rash, papular in some parts, the colour was that of raw ham. The history extended over three weeks before admission; there had been occasional fits with watery diarrhœa.

Vide Dr. Wilson Fox's *Case-book*, 1880.

3494. Part of the cortex of the right hemisphere, including nearly all the vertical portion and part of the upper surface. The specimen shows a somewhat unusual distribution of tubercle. The tubercles are seen to occupy more particularly the middle transverse zone, and on the inner surface may be seen closely beading a branch of the anterior cerebral running towards the upper end of the fissure of Rolando. A little lymph has been thrown out along the course of this vessel in the pia mater, and obscures somewhat the outline of the individual tubercles. The white matter for a small area just beneath the fissure of Rolando has undergone inflammatory softening. In the recent state the surface of the brain showed the plump flattened convolutions and dry sticky surface characteristic of tubercular meningitis. 5913

3495. The posterior part of the dura mater with part of the falx cerebri and tentorium cerebelli, showing a tubercular mass which is attached to the inner surface of the dura just to the left of the torcular Herophili. The mass, which is sessile, is of firm consistence, yellowish in colour and slightly granular on the surface. Towards the dura it shows a distinct fibrous covering which ends abruptly at the circumference. In immediate proximity to this mass are a few nodules of lymph on the dura mater. The sinuses in the dura mater are full of blood-clot. The outer surface of the membrane is normal, nor are there any other evidences of its being affected by tubercle. It is probable that this mass originated in the pia mater of the cortex, that the pia-arachnoid then became adherent to the dura, and that the softening of the brain-substance, which is so frequently seen round tubercular foci, allowed of its detachment. This explanation will account for the presence of the thin fibrous covering mentioned, which otherwise would be difficult. 5910

History.—The patient, a boy, æt. 6, was admitted into University College Hospital with a history of convulsive attacks. On admission these were seen to affect the right side, commencing with conjugate deviation of the eyes to the right, twitching of the right foot extending up to the leg, then chronic spasm of the right arm, and finally of all the right side and the face. The child died after the second fit.

Post-mortem Examination.—Tubercular matter in lungs, liver, peritoneum, and mesenteric glands. Left empyema. The tubercular mass seen in the specimen had indented the subjacent brain-substance, *i. e.* the second left annectant gyrus of the occipital lobe. There were two yellowish tubercular nodules at the bottom of the right Sylvian fissure. There was also a tuberculous mass, half an inch in diameter, in the left half of the pons.

3496. A piece of the dura mater which has been the seat of a tubercular deposit. The small nodules seen scattered over the specimen are precisely similar to those commonly seen on the pia mater. The point of interest is the distribution of the tubercles, which are very rarely met within the cranial dura, though more common in the spinal dura mater. 4379

3497. A specimen of tubercle of the pia mater. The nodules are especially numerous along the course of the blood-vessels and in the processes of the membrane which dipped down into the sulci of the hemisphere. 2219

3498. The membranes and vessels from the Sylvian fissure from a patient who died of tubercular meningitis. The pia mater is densely studded with small opaque nodules about the size of a pin's head. In many places these coalesce so as to obscure the course of the vessels, but in others they can be traced along the sheaths of the smaller vessels, appearing as small nodal points. The distribution of the tubercles is typical, viz., starting from around the circle of Willis and extending along the Sylvian fissures, lessening in number as the vessels approach the vertex. The pia mater is slightly opaque but no lymph is to be seen. 5817

TUMOURS OF THE BRAIN AND CEREBRAL MEMBRANES.

Morbid growths of the central nervous system are by no means uncommon; the most usual one is glioma, which is almost confined to the nervous centres. Myxoma, sarcoma, and carcinoma are of frequent occurrence, and among the more rare tumours may be mentioned angeioma, fibroma, psammoma, and cholesteatoma. Osteoma and lipoma have been met with. The Tænia Echinococcus and Cysticercus cellulosæ are sometimes met with in the cranial cavity (*vide* Parasites of the Brain, page 127).

Although tubercular masses and gummata are common and produce symptoms of tumour, they cannot be correctly included in this category.

During life it is impossible to diagnose with any certainty the precise nature of a growth unless the lesion be secondary to disease elsewhere.

Tumours are more common in the white substance of the hemispheres than elsewhere, and recurrence after removal by surgical means is more likely to occur in the white than in the grey substance. The growth is usually close to the surface of the brain, and the membranes may become matted together and adherent to it: it very rarely produces any bulging on the surface.

The surrounding brain-substance is not unfrequently in a condition of softening produced by the pressure exerted by the growth (No. 3514). The ganglion-cells and axis-cylinders of the nerve-fibres swell up and become homogeneous in appearance, and finally undergo fatty degeneration.

The irritation caused by the growth may occasion chronic inflammation of the membranes and also of the surrounding parts of the brain. Optic neuritis is common, especially in advanced cases (No. 3501, History).

By the compression caused by the growth, the ventricles may become dilated from the accumulation of fluid in them (No. 3517). The sinuses may also be involved (Nos. 3505, 3507).

The effects referable to the presence of the tumour will naturally differ according to the size, duration, and position of it: but speaking generally it may be said that when the tumour has only been present for a short time, there will be signs of irritation merely, viz. convulsions and pain, but when it has induced secondary degeneration of the cerebral centres there will be paralysis with anæsthesia. Tumours not infrequently contain corpora amylacea in great numbers.

i. *Glioma.*—This, the commonest form of tumour, usually occurs in the white substance of the hemisphere, just beneath the surface. In some cases they grow to a large size, and may not be easily differentiated from the surrounding brain-substance (No. 3514), in others they are clearly defined and distinct. The substance of the growth may degenerate and so become cystic, or hæmorrhages may occur. In some cases the vessels may be very large, constituting a form of angio-glioma: in others again the tissue becomes infiltrated with mucous liquid—myxo-glioma.

In colour gliomata are of a pale grey sometimes mottled with hyperæmic patches. The consistence is about the same as normal brain-substance, but it may be rather harder or softer, especially if degeneration has set in.

ii. *Sarcomata* may occur as a primary (No. 3504) or secondary growth (No. 3501). The common forms met with are the round and spindle-celled, melanotic is not uncommon (Nos. 3502 and 3503). The tumours originate in the neuroglia or in the pia mater dipping into the sulci; they may also occur in connection with the dura mater, or commencing outside the skull may perforate the bone and secondarily affect the dura mater (Nos. 3509 and 3510). Sarcoma of the dura mater may affect only one part or may spread over a large area (No. 3506). The tumour may be flattened or form a definite prominence on the surface, producing a corresponding depression in the brain (No. 3500). Sarcomata in the brain-substance are usually sharply circumscribed (No. 3500) and vary in size. They undergo all the changes seen in sarcomata elsewhere.

iii. *Psammoma* is a form of sarcoma impregnated with lime-salt constituting the so-called brain-sand. They do not usually attain a large size and are commonly situate in the ependyma of the ventricles.

iv. *Carcinoma* is most usually met with as a secondary growth, but occasionally it may occur as a primary disease, originating in the epithelium of the choroid plexuses or ependyma. The cells are usually columnar or cylindrical in the primary forms, and the growth may assume a papillated appearance. If the growth is secondary to cancer elsewhere, it is usually found to be multiple.

v. *Cholesteatoma* is a rare tumour characterized by the presence of rounded pearl-like bodies of a white silvery appearance, and in some cases small hairs have been found, tending to show that these growths are really dermoid in character and due to the inclusion of epiblastic cells. The main substance of the growth is white and soft in consistence and is composed of epithelium scales.

The other tumours occurring in connection with the brain and its membranes are so rare that any detailed description of them is unnecessary. The Parasitic Cysts are described at page 127.

3500. The posterior part of the right hemisphere of a brain showing half of a round sarcoma in the hinder end of the temporo-sphenoidal lobe. The growth is dense in consistency and is strictly isolated, lying in a deep depression on the surface. A depression is also seen in the occipital lobe. This was occupied by the small rounded growth seen adherent to the portion of dura mater preserved in the specimen. The brain-substance is apparently healthy. 6509

3501. The anterior part of the right hemisphere of the brain of a man who died from the effects of an operation for sarcoma of the clavicle. Situate in the inferior anterior angle immediately internal to, but not affecting the grey matter, is a rounded tumour measuring ¾ inch in its greatest diameter. The growth is distinctly circumscribed, but not encapsuled, and can be lifted from its bed with ease. The surrounding brain-substance is healthy. 6332

History.—W. S., aged 30, was admitted under Mr. Heath on Feb. 2nd, 1888. Mr. Eve (of the London Hospital) removed a tumour from the tissues over the outer part of the left clavicle three years and ten months ago. The tumour had been growing one year. In October 1887 the patient met with an accident and broke the clavicle: after this a swelling was noticed. On Feb. 8th Mr. Heath excised the clavicle preserved in the Surgical collection, No. 661 B. The patient remained in a drowsy state after the operation and gradually became comatose. The temperature ranged between 98°·8 and 102°·8, but just before death on the eleventh day rose to 106°·2. Pulse from 126 to 170. On the ninth day after operation there was well-marked double optic neuritis with extravasations. Dr. Bastian diagnosed secondary growth in the brain. On the day of death in the morning both pupils were dilated and inactive to light. The right arm was rigid; left arm included in the bandages and not examined; both legs paralysed and limp; knee-jerks absent. Ankle clonus on left side.

Post-mortem Examination.—Wound healed and quite dry. The right hemisphere of the brain was prominent, and convolutions flattened. No other growth except that preserved in the specimen was found in the brain. Secondary growths in the lungs. Other organs healthy.

3502. A portion of the right cerebral hemisphere showing secondary growths of melanotic sarcoma in the cortex. The largest of these is about the size of a Barcelona nut, and is situate in the posterior part of the third frontal convolution: another is in the ascending frontal close to the fissure of Rolando: a third lies just below the hinder end of the Sylvian fissure, where the first temporo-sphenoidal joins the angular convolution. A very minute deposit is seen at the posterior part of the first annectant gyrus. The deposits, dark-brown in colour and of friable consistence, occupy the grey matter of the cortex; they are sharply defined and generally circular in outline, but are not encapsuled. The surrounding brain-substance is normal in appearance, there is no sign of hæmorrhage or inflammatory softening.

History.—The patient was a labourer, æt. 58. Twelve months before admission he had a sore on the front of his leg which took long in healing. Four months later he noticed a swelling in the groin, which steadily increased in size. He also complained of slight numbness and loss of power in the left arm. Mr. Marshall removed the tumour from the groin. Twelve days after the patient drank heavily and from alcoholic narcosis passed into a semi-comatose condition, death occurring in forty hours after three hours of complete unconsciousness. There was no paralysis or convulsions; death occurred with rapid respiration and weak pulse.

Post-mortem Examination.—At the post-mortem secondary deposits were found in the heart, lungs, intestines, and suprarenal capsules. The glands in the right groin and by the side of the internal iliac artery were affected; on the left side there was a hard tumour under the peritoneum, also two or three smaller ones. In the brain deposits were found in the medulla, in addition to those shown in the specimen.

Vide Mr. Godlee's case, Path. Soc. Trans. vol. xxv. p. 18.

3503. The medulla, pons, and crura cerebri, showing a secondary deposit of melanotic sarcoma in the medulla oblongata. The mass occupies the middle line immediately below the hinder border of the pons. Its outline is rounded, it is of a brownish-black colour and of soft consistence. The nervous substance appears quite healthy in the vicinity of the growth, which is strictly circumscribed but does not possess any capsule. Nearly the entire thickness of the medulla is involved. The patient died with respiratory and cardiac failure, rapid respiration and weak pulse. The specimen is from the same case as the preceding.

3504. The left and part of the right half of the dura mater of the vertex, showing its involvement by a new growth. On the inner surface of the membrane, over an area 2½ inches in its longest diameter, are numerous masses of new growth; the central one is the largest, and grouped round it are many smaller nodules. One or two similar nodules can be seen on the inner surface of the right half of the dura. On the outer surface of the membrane, corresponding with the tumours, are shaggy areas partly inflammatory in nature indicating the positions at which the dura mater was adherent to the skull-cap. The superior longitudinal sinus is pervious. The microscope shows the tumours to consist of masses of cells of indefinite nature. Large rounded spaces filled with red cells pervade the growth and constitute a prominent feature of it. The specimen is probably a very vascular sarcoma. The upper surface of the left hemisphere was found depressed and congested in the lower half of the ascending frontal convolution, also in the hinder end of the second frontal and contiguous portions of the first and third frontals. There were no secondary growths in any part of the body. 5403

History.—The specimen is from a man, æt. 30, who was under the care of Sir W. Jenner in 1869, having a three months' history of illness. He complained of lumbar pain, with occasional morning vomiting. Whilst in the hospital alimentary disturbances were marked; there was vomiting, constipation, and occasional fever. With the exception of anæmia, which became very marked, there were no other definite symptoms. There was no evidence of pressure on the cortex.

3505. A portion of the dura mater with the falx cerebri. Two flattened masses of new growth symmetrically placed on either side of the falx are seen on the inner surface of the membrane. The masses are nodulated, and the nodules are hard and tough on section and of a pale yellow colour. Anteriorly the growth has invaded the falx, and the wall of the superior longitudinal sinus is thickened. Posteriorly the floor of the sinus has become invaded, but the lumen is pervious throughout. The tumour is a fibro-sarcoma. 5039

3506. The greater part of the dura mater of the vertex, which is the seat of a disseminated new growth. The whole inner surface is strewn with flattened nodules, varying in size from that of a pin's head to a split pea. At various spots coalescence of adjacent nodules has occurred. Here and there are seen delicate laminæ of adherent lymph. On the outer surface no new growth can be seen, but it is extensively coated with yellowish adherent lymph. The presence of the lymph has deprived the inner surface of its usual smooth and polished appearance. The microscope shows the growth to be a fibro-sarcoma. The history has been lost, but the disseminated nature of the affection indicates that it was probably secondary in character. 2257

3507. A sarcoma of the dura mater springing from the falx cerebri near its anterior end. The growth projects on either side, but principally to the left. The walls of the superior longitudinal sinus are much thickened and implicated by the tumour, the lumen having been obliterated. The outer surface of the dura mater is roughened. The tumour is globular and lobulated, but the surface is almost quite smooth, being enclosed by a distinct fibrous capsule. The substance of the growth is uniformly pulpy in consistence and of a dark brown colour. 435

Microscopic examination proves the growth to be a round-celled sarcoma.

3508. Part of the dura mater, the seat of a sarcomatous tumour. A large mass projects from the outer surface immediately to the right of the superior longitudinal sinus. Its surface is rough and here and there are spiculæ of bone. The cut surface is homogeneous in appearance. The smaller mass is only part of a tumour. The longitudinal sinus is apparently unaltered by the presence of the growth. The inner surface of the membrane, from which the falx is seen projecting, is everywhere smooth, glistening, and normal in appearance.

From the same case as the next specimen. 5456

3509. Portions of a parietal bone affected by sarcoma. The new growth projects on each surface of the bone. On the inner it is very ragged in appearance, perhaps due to its having been torn in removing the skull-cap. The bone around is porous and sponge-like. Externally the periosteum, raised by the tumour, is still intact. The same surface of the bone shows both inner and outer tables to have been diminished in thickness by rarefaction, the cancellous tissue being proportionately thicker. The spaces of the cancellous bone are filled with whitish material of exactly the same appearance as the tumour-substance.

From the same case as the preceding specimen. 5455

3510. A portion of the vault of the skull showing a tumour forming between it and the dura mater. The growth is lobulated and diffused, eroding the inner surface of the bone; the outer surface has a roughened appearance from the presence of small deposits of new growth. The inner surface of the dura mater is perfectly smooth, glistening and healthy in appearance.

Microscopic examination shows the growth to be a round-celled sarcoma. 124

History.—The specimen with numerous others was removed from a child, who at birth had a "small tumour on the forehead." This was removed when the child was two years old: the wound did not completely heal till three months later. In a short time recurrence occurred at the seat of the original growth and also in the knee, groin, and on the side of the chest. These tumours grew rapidly, causing much deformity. The shape of the head was almost unrecognizable from the presence of the growths, which attained a very large size. The child was cheerful and apparently contented till within a few days of its death.

3511. A photograph of a brain showing a sarcoma in the temporo-sphenoidal lobe on the right side.

3512. A transverse section of the hemisphere from the same case, showing the infiltration of the white substance by the sarcoma, into the substance of which small extravasations have occurred.

3513. Three photo-micrographs of the preceding case.

3514. The right half of the cerebrum. On the under surface there is a large tumour involving the whole anterior part of the temporo-sphenoidal lobe, the posterior part of the island of Reil, and the optic thalamus. The growth is not distinctly circumscribed, having no capsule, but infiltrates the parts in which it grows. The lateral ventricle has been considerably encroached upon by the optic thalamus, which is much enlarged by the growth of the tumour. On the median surface of the hemisphere in the anterior part of the marginal convolution is another small growth projecting slightly above the surface. The tumours are soft and friable in consistence. At the post-mortem examination the tissues round the large tumour were found to be congested and softened, the neighbouring convolutions were flattened, and there was a general excess of the subarachnoid fluid. The small growth situate in the marginal convolution had caused cupping of the neighbouring part of the opposite hemisphere, to which it had become adherent.

Microscopic examination proves the growths to be gliomata. 6069

History.—The patient, æt. 70, was admitted into University College Hospital under Dr. Roberts, June 17th, 1884. He died August 11th, 1885. The illness had begun fourteen weeks before admission, previously to which he had become morose, apathetic, and had lost his appetite. The onset of definite symptoms was sudden; the patient fell down, but did not lose consciousness, and was after this confined to bed, owing to excessive weakness. On admission he was drowsy, stupid and feeble; there was incontinence of urine and fæces, with occasional priapism. A bed-sore had formed on the left buttock and another to the right of the sacrum. There was paresis of the left arm and leg, but no rigidity. The tongue deviated slightly to the right when protruded. Vision was obviously impaired, but the other special senses appeared intact. During the progress of the case the general symptoms deepened, double optic neuritis developed, and the patient became quite blind. For a day or two before death there was dysphagia; coma developed suddenly, and death supervened with stertorous breathing. Throughout the case there had been no pain, vomiting, or general convulsions or spasms. The temperature remained normal, and the urine free from albumen or sugar.

3515. The medulla and pons with the cerebellum, showing a gliomatous tumour projecting into the fourth ventricle. The growth does not occupy the hinder half of the floor of the ventricle, which is merely compressed by it, but otherwise apparently unaltered. Anteriorly the pons is seen much enlarged, but still its shape is recognizable; its surface is irregularly lobulated. The origins of the seventh and eighth nerves have been carried out laterally by the swelling of the pons, and similarly the roots of the fifth are much displaced. The lateral halves of the cerebellum are compressed and separated from one another by the growth. A noticeable point in the specimen is the fact that in spite of the presence of the growth the pons still retains its general shape, the tumour having merely infiltrated the parts so as to make them seem simply hypertrophied. Similar cases have been described as a "peculiar form of hypertrophy" or as "gelatiniform enlargement of the pons." These cases are, however, now known to be instances of diffuse glioma of the parts (*vide* Medico-Chirurgical Transactions, vol. lxvi.). 5923

3516. The pons, medulla, and cerebellum with the adjacent parts of the cerebral hemispheres. There is an oval tumour about the size of a walnut lying in a hollow occupying the entire breadth of the right half of the pons Varolii. Its long diameter lies obliquely in the same direction as that of the superficial fibres of the pons. The surface of the growth is comparatively smooth and is enveloped in an ill-defined capsule. The cut surface is soft and granular. The sensory root of the fifth nerve is displaced backwards and the nerve spread out as a broad thin band over the posterior end of the tumour. The growth is only very loosely connected to the brain-substance and appears to have sprung from the pia-arachnoid.

Microscopic examination is impossible, owing to the condition of the specimen. The specimen illustrates the simple mechanical effects of pressure on adjacent parts without any implication of them by the growth. 5906

History.—The history is very meagre. The patient, a woman whose age is not stated, was admitted into the wards for the insane in St. Pancras Workhouse on February 1st, 1883. She died on March 3rd, having previously been comatose. She is reported to have had a fit some time before admission to the Infirmary. There was no history of any local spasm or paralysis.

3517. The medulla and pons, the fourth ventricle being occupied by a tumour, which arises from the floor of the ventricle and involves both pons and medulla. It has originated on the left of the middle line and has pushed the structures on the right considerably towards the right, thus leading to much obliquity of the medulla, even at the lower part. The tumour nearly fills the ventricle: it is about the size of a Spanish chestnut and is rounded in outline, but lobulated on the surface. Its section is firm and homogeneous. From its position the growth would displace laterally and press upon the canal of the iter, giving rise to obstruction and so tending to cause accumulation of fluid in the third and lateral ventricles; this would be the greater since the veins of Galen would also probably be subjected to pressure, and the venous obstruction thus produced would give rise to dropsical effusion. 1112

Microscopic Examination shows a fibro-cellular structure, the cell-element of which is best marked in the deeper parts. The absence of caseation in a tumour of this size is against its tubercular nature. The precise nature is doubtful, it rests between tubercle, gumma, and glioma.

3518. The pons and medulla with part of the cerebellum. Projecting into the floor of the fourth ventricle, which is well seen, are some small, warty-looking tumours, apparently in connection with the choroid plexuses. The growths are symmetrically placed near the calamus scriptorius.

Similar growths have occasionally been met with of sufficient size to block the fourth ventricle and so produce dilatation of the lateral ventricles. 2275

3519. A tumour of the choroid plexus, taken from the brain of a lunatic. The growth is of moderately firm consistence, oval, and smooth on the surface. The surface of the section is sponge-like and is distinctly gritty.

A similar but smaller tumour was situate in the opposite choroid plexus. 5772

For Wax Models, vide page 153, *Nos.* 3654 *to* 3655.

CYSTS OF THE BRAIN AND MEMBRANES.

Cysts may originate in the membranes of the brain as the result of pachymeningitis, or from the organization of the outer layers of the blood in a subdural hæmorrhage.—Subdural blood-cysts, page 127.

Certain parasitic cysts are met with. The only ones occurring in the human brain are, in their order of frequency:—Tænia echinococcus, Cysticercus cellulosæ, and Cysticercus racemosus (*vide* page 127).

Besides these, cysts may originate as a result of old apoplexy (*vide* Cerebral Hæmorrhage, Nos. 3467, 3470, and 3471); or consequent upon cerebral softening.

As a result of old standing cerebral softening it is by no means uncommon to find that cystic cavities, varying in size but being usually small, are found in greater or smaller numbers. In some cases they may so riddle the cerebral substance that it resembles Gruyère cheese (No. 3520). The contents of the cysts may be quite clear, or may be stained by altered blood-pigment, or opaque from admixture of the disintegrated brain-tissue. The walls may be quite sharply defined and smooth (No. 3520), or may be shreddy from the softening that has occurred. Not unusually these cystic spaces occur round the vessels, the surrounding substance having undergone disintegration, and the resulting space being filled with fluid.

In some cases it is said that these cysts are the result of the accumulation of the gases from post-mortem decomposition. But against this view is the fact that they are met with immediately after death frequently within twenty-four hours, and that we should, if this theory be correct, expect to meet with these cysts more commonly.

3520. Two sections of the brain of a subject brought into the dissecting-room. The substance is riddled with cysts, occupying both grey and white matter, but more especially the latter. They are of varying size, with well-marked sharp outline and smooth walls. The brain-substance round the cysts is normal. The general appearance is like that of Gruyère cheese. The precise nature of the cysts is doubtful, but it is possible that, in some cases at least, they are post-mortem, and caused by the formation of gases during decomposition. Similar cysts of doubtful origin have been met with in the liver. (*Vide* Nos. 3424 and 3425.) 5678

BLOOD-CYST OF THE BRAIN.

These cysts are probably formed from the organization of the superficial layers of effused blood which may come from one of the vessels of the dura mater, or from a vein entering a sinus, or from vessels of the pia mater, the arachnoid having been torn. The hæmorrhage may have resulted from external injury, or have arisen spontaneously, as in the course of certain diseases, *e.g.* Bright's or typhus.

According to another view these membranes are primarily due to an inflammatory affection of the dura mater (pachymeningitis), with subsequent interstitial hæmorrhage from the vessels developed in the exudation membranes.

(*Vide* Apoplexy, page 112.)

3521. The dura mater lining the calvarium with the falx cerebri. On the right side is a large cyst measuring nearly five inches from before back. The outer wall is thick, but the inner one much thinner. They are both tough and fibrous. The outer one can be readily separated into two laminæ, of which the inner one is the thicker and of a brownish tint. The inner aspect is of a brick-red colour. The specimen illustrates the formation of a cyst from changes occurring in extravasated blood. 6521

3522. The right half of the dura mater, with the falx cerebri. The outer surface is normal in appearance. Attached to nearly the whole of the inner surface is a blood-cyst; it is limited in the middle line by the falx, which is healthy. In order to clearly show its relation to the dura mater the cyst-wall has been separated from it for some distance. The cyst-wall on the dural side is thicker than on the cerebral; on closer examination it is found to be laminated. The surface of the cyst in contact with the brain is smooth; it has been cut open so as to show the contents, which consist of altered blood-clot. The fluid contents have escaped. 3664

3523. A portion of the dura mater, showing a fibrous membrane, probably the wall of a blood-cyst, attached to its inner surface. The dura mater is not thickened or altered in general appearance; the inner surface, from which the false membrane has been partially detached, retains its pearly lustre. The cyst-wall forms a continuous fibrous layer of about half the thickness of the dura. A few very minute new vessels can be traced near the edge of the membrane. Both surfaces present a brick-dust colour, as though the membrane had been sprinkled over with a fine powder; this colour is due to altered blood-pigment, its presence, together with the absence of any signs of meningitis, is strongly in favour of the view that the membrane is the result of a long-past extensive hæmorrhage between the dura mater and arachnoid, which has become partly organized. The source of the hæmorrhage cannot be ascertained. 432

PARASITES IN THE BRAIN.

The only parasites met with in the human brain are the Tænia echinococcus, Cysticercus cellulosæ, and Cysticercus racemosus. In the brains of sheep and some other animals a parasite known as the Cœnurus cerebralis is met with.

The presence of these cysts does not usually set up ill effects other than those due to simple pressure, the effects of which will necessarily depend upon the size and situation of the tumour. Suppuration is almost unknown. The cyst-wall may calcify (No. 3526). A full account of the life-history of each parasite will be found under "Parasites" (page 134).

Hydatid Cysts (no specimen) are rarely met with and, when present, are usually barren. They occur singly, and are most commonly found in the substance of the cerebral hemispheres, but may occur anywhere, filling up the ventricles or being attached to the meninges.

Cysticercus cellulosæ (No. 3524) is the larval form of the Tænia solium, and usually occurs in the substance of the hemispheres, but may be in connection with the membranes (No. 3524) or choroid plexuses. The cysts are usually multiple, but distinct, as many as a hundred having been met with, and vary in size up to that of a pigeon's egg.

Cysticercus racemosus differs from the preceding in consisting of a group of large sterile vesicles, somewhat resembling a bunch of grapes.

Cœnurus cerebralis, or Gid-hydatid (No. 3525), is the larval form of Tænia cœnurus, which inhabits the alimentary tract of the dog and wolf. The parasite is common in sheep; it also affects the brains of cattle, goats, deer, antelopes, the giraffe, camel, and horse.

The larval form was supposed only to affect the brain and spinal cord, but specimens have been met with in the subcutaneous and intermuscular areolar planes, notably of the rabbit; some authors, however, look upon this as a different species.

The Cœnurus is characterized by the presence of a large vesicle containing clear fluid, attached to the walls of which are a number of scolex-heads measuring $\frac{1}{6}$ inch long by $\frac{1}{18}$ inch broad, and provided with four suckers and a rostellum surrounded by a double coronet of hooklets, fifteen in each row. The skull of the sheep over the seat of the parasite becomes soft and thinned, and in some cases perforated, having a honeycombed appearance (No. 3525). This softened area of bone is cut out by the shepherd, who then extracts the parasite with a roughened quill, the bone is replaced, and a bandage applied. In some cases this treatment is successful, but more usually the animal dies from exhaustion.

The presence of this parasite produces in sheep the condition known as "Staggers," a disease characterized by rotatory movements of the animal (No. 3525). Staggers in horses is the name given to a condition, dependent on a morbid state of the brain, in which the animal reels or staggers in his attempts to walk; it is usually easily benefited by bleeding from the vessels of the palate or throwing cold water over the animal.

3524. A small part of one of the cerebral hemispheres, showing a small membranous cyst situated in one of the sulci. It is about the size of a large pea, and probably springs from the pia mater. The neighbouring convolutions are slightly indented by the growth, but there is no sign of inflammatory softening in the neighbourhood. The cyst is probably that of Cysticercus cellulosæ. 2207

3525. Part of the right side of the skull and the right half of the brain of a sheep. The anterior two thirds of the cerebral hemisphere have been extensively destroyed; towards the vault a thin layer of brain-substance is all that remains; towards the orbit it has been completely removed, exposing the dura mater, but at the base a thick layer of brain-substance is still present; on the surface of this is a thin membrane, which can be easily raised but is very friable. The lining membrane of the cavity is of a light brown tint. The dura mater appears healthy. The orbital wall of the skull is abnormally thin. The cyst is that of the Cœnurus cerebralis. The sheep suffered from "Staggers." 1111

3526. A calcareous cyst which was found in the brain of a sheep, situated on the corpus callosum rather to the right of the middle line. It is impossible to determine the nature of the cyst, but it is probable that the specimen represents calcification of the walls of a cyst of the Cœnurus. 1696

CONCRETIONS IN THE BRAIN, SPINAL CORD, AND MEMBRANES.

i. *Corpora Amylacea* are normally met with in the brain, but are much more abundantly seen when any degenerative process has occurred, or in tumours (No. 3519). They form small usually rounded masses distinctly stratified on section, and sometimes containing foreign matter in the centre, especially blood-clot. They are very numerous in the ependyma of the ventricles. Similar bodies are also met with in other parts of the body, notably in the prostate gland.

The precise nature of these bodies is doubtful; in some cases they do not give the characteristic iodine-reaction of starch, and are stained brown or black by perosmic acid. In reaction and their doubly refractive power these bodies resemble myeline, and it has been suggested that they may be derived from this substance.

ii. *Brain-Sand* (No. 3532) is found normally in the brain at all ages, but is met with in larger quantities in advanced life. It occurs constantly in the pituitary body and in the choroid plexuses. Brain-sand is also met with in the new growth called psammoma. The minute gritty particles have no pathological significance; they are composed of a small amount of animal matter mixed with phosphate and carbonate of lime, with a small quantity of ammonio-magnesian phosphate.

iii. *Ossification of the Membranes* (Nos. 3527 to 3530).—Osseous deposits are not uncommon in the arachnoid membrane of the cord (No. 3530), but the dura mater of the cord is rarely affected. In the arachnoid the osseous nodules may be very few or numerous, and are usually situate in the lower dorsal or lumbar regions and on the posterior aspect. So far as is known these nodules have no special clinical significance.

In the cranial cavity the dura mater is more usually affected, and the free margin of the falx cerebri is a favourite seat (Nos. 3527 and 3528).

3527. Part of the dura mater with the falx cerebri, from a man who committed suicide. To the right of and close to the free border of the falx cerebri is a small, oblong, raised mass of bone, covered on its free surface by a delicate fibrous lamina. There was a smaller mass situate on the under surface of the tentorium, but this has become detached. The presence of the investing fibrous layer indicates that the ossification took place in the thickness of the dura mater. The longitudinal and lateral sinuses have been laid open and are healthy. 5955

History.—The gentleman from whom the specimen was taken was an Afghan, and a student of the Medical Faculty of University College, London. He committed suicide by taking prussic acid.

3528. A portion of the falx cerebri, in the thickness of which there is a deposit of bone. This deposit is sickle-shaped, and on one side finely tuberculated. The fibrous investment has been dissected off on one side to show the surface of the bony mass, which is found microscopically to have the character of true bone. 2413

3529. The falx cerebri, which has been injected and dried. At its anterior and lower part there is an irregular ossified plate, extending quite to the free margin of the falx. 434

3530. The lower part of the spinal cord, the cauda equina, and the membranes which have been slit up and turned aside. The arachnoid membrane is seen to be studded here and there with small opaque granular bodies, which are ossific in nature. They are convex on the surface, touching the pia mater, but flattened opposite the dura mater. 3608

3531. A small calculus removed from the pineal body. 1118

3532. Concretions removed from the pineal body. The specimen showing the finest particles is a good illustration of the so-called "brain-sand." 2559

MISCELLANEOUS SPECIMENS.

3533. Half of the cerebrum, from a rickety child. It is apparently enlarged, but the evidence of hypertrophy is not marked. Thus there is no flattening of the convolutions, and the sulci are well-marked and deep, whilst the ventricle is certainly not diminished in size. Further, where the brain-substance is seen in section, the white substance does not appear to predominate unduly, as it is said to do in such cases, the hypertrophy chiefly affecting the white substance and the neuroglia. 5750

3534. The brain of a microcephalic idiot. The absolute size of the cerebrum is small; it weighed only six ounces and incompletely overlapped the cerebellum. The proportion of the weight of the centrum to that of the cerebellum is as six to two and a half instead of eight or nine to one, the normal proportion. The frontal and occipital lobes are less developed than the temporo-sphenoidal. The cerebral convolutions, though well marked, are fewer than normal, and the convoluting is least apparent on the under surface, especially in the orbital region. The brain appears to be more simply convoluted than the brains of the higher apes, and (as in the fully developed human brain) there is less symmetry between the two sides of the brain than in the apes. The ventricle seems to be relatively larger. The corpora striata are much smaller than the optic thalami, and both pairs of the basal ganglia are smaller than natural. The pons is also small, but the medulla well developed. The cerebellum, though not perfect, is more developed than the cerebrum. The corpus callosum is shorter and thicker than natural. There was no disease of the brain or membranes, but the dura mater was slightly thicker than natural. 4121

History.—The child, 12 years old at the time of death, had a small head, large face, and good set of teeth; the eyes were large, the forehead receding, and the features those of the Aztec type. The body measured 39·5 inches; the limbs were perfectly formed, but the child was quite unable to feed, clean, or dress himself, nor could he walk or stand. He was unable to talk, but could cry, laugh, and utter articulate sounds. Death resulted from a spinal abscess, followed by abscess of the lung. The inability to walk was in no way connected with the spinal disease.

Vide Philosophical Transactions, 1864, Professor Marshall, "The Brain of a Bushwoman and those of two Idiots."

3535. The calvaria of a microcephalic idiot, from the same case as the preceding. The skull is elongated from before backwards, the frontal region is very small, narrow, and sloping, and of the ploughshare form. There is no trace of the mid-frontal suture. The other sutures are closed, and the posterior $\frac{2}{3}$ of the sagittal obliterated. The calvaria is heavy, the diploë being dense, and the thickness excessive, in some places as much as $\frac{1}{4}$ inch. The parietals are deeply marked by the cerebral convolutions. 4122

3536. A portion of the base of the brain, showing atrophy of the left optic nerve following loss of the left eye. The optic tracts are not apparently different in size, but the diminution of the optic nerve on the left side is marked. In this specimen there seems to have been a partial decussation of the optic nerves. The convolutions round the posterior extremity of the Sylvian tissue present no difference of size on the two sides. 5546

History.—John C., æt. 45, lost the left eye consequent on injury in 1876. He died in January 1881.

The following is an extract from the notes made at the autopsy by Dr. H. C. Bastian:—On examination of the optic nerves the left is found to be of a grey colour and smaller than the right. The greyness extends as far as the commissure, but beyond it no grey tint is appreciable in either optic tract, nor is there any apparent difference in the size or general appearance. The right external geniculate body is smaller than the left, its bulk being diminished by about $\frac{1}{3}$ or more. The corpora quadrigemina do not differ.

3537. The anterior and middle portions of the brain, from a patient who had suffered from blindness of the right eye. There is atrophy of the right optic nerve, with considerable consecutive wasting of the inner strands of the left optic tract and slight wasting of the outer strands of the right optic tract. This specimen certainly tends to show that in the optic commissure the crossing fibres are the most numerous, a point on which there is considerable difference of opinion. 2090

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SERIES LIII.—DISEASES OF THE SPINAL CORD.

3538. Four sections of a healthy spinal cord. The one on the extreme right is taken from the lower part of the cervical cord, the second from the mid-dorsal region, the third from the upper half of the lumbar enlargement, and the last from the lower half.

ATROPHY AND DEGENERATIONS OF THE CORD.

Crossed Paralysis.

The specimens illustrate typically the effects which follow on a unilateral lesion situated in the outer tract anywhere above the decussation of the pyramids, *i. e.* in the medulla, pons, crus, white substance or cortex cerebri.

In their nature the effects are termed degenerative, and, as is seen, they descend into the cord from the focal lesion above. The degeneration close to the anterior median fissure affects the so-called direct pyramidal tract, that in the lateral column affects the crossed pyramidal tract.

This coincident affection of the lateral column of one side and the anterior column of the other continues down to the lower half of the dorsal cord ; here the decussation of the pyramids, which begins, as a rule, just below the medulla, is completed. From this region downwards the degeneration is entirely unilateral, and on the opposite side to the primary lesion above. The small strip of tissue between the lateral pyramidal tract and the circumference of the cord, which, in the second and third sections is seen to be normal, is the direct cerebellar tract which is believed to be composed of different, *i. e.* ascending fibres ; these tracts become less marked in the lower dorsal, and disappear in the lumbar region of the cord.

3539. Four sections of the spinal cord, from a case of crossed paralysis. In examining these sections it will be necessary to hold the frame against the light, and to note that in the mounting they have inadvertently been turned upside down.

The cervical section (the left-hand side) shows the white substance of the right lateral column to be distinctly darker in colour, an appearance as of increased density of texture ; in the left lateral column in the same situation there is a similar, though slighter change. Along the anterior median fissure on the left side is a narrow dark strip. These dark patches are areas of degeneration.

The next section, from the upper dorsal region, shows a similar condition, but better marked. In this section it is to be noted that the degeneration in the right lateral column does not extend quite up to the circumference ; this is even better seen in the third section, which exhibits the same changes.

The fourth section has been reversed in mounting, hence the condensation which is really in the right lateral appears on the left side. It is difficult to make certain of any change in the anterior column near the median fissures. The anterior horn of grey matter on the left side is larger than on the right.

In the three sections taken from the cervical and dorsal regions a slight condensation is seen in the left lateral column ; this corresponds in position with the change in the right lateral column, but is much less marked in degree.

History.—The patient, æt. 43, was admitted into University College Hospital under Dr. Bastian in 1882. Eight and a half months previously he had been attacked with right-sided paralysis. The hemiplegia had begun suddenly as a weakness, which in the course of 24–28 hours became well-marked paralysis. The left side of the face, right arm, and leg were affected ; the sight and speech were impaired, and there was some dysphagia. General sensibility was unaffected. Partial recovery took place, until at the end of two months the patient could walk with the aid of two sticks. When admitted there was right hemiplegia and left facial paralysis ; no aphasia, but great difficulty in articulating. The tongue deviated to the right. The paralysis of the leg was only partial, but was more complete in the arm, where late rigidity was present. Sensation normal. The plantar reflex and knee-jerk were excessive on the right side, and there was also ankle clonus. The urine contained a trace of albumen and 4·37 grains of sugar per ounce. The rectal temperature varied from 99°–100° F. During the progress of the case there was marked intellectual feebleness with emotional attacks, the difficulty in articulating became worse, and the dysphagia increased sometimes to such an extent that the patient had to be fed by catheter. The pupils varied from time to time. At one time general feebleness was noted, with distinct paresis of the left hand. The temperature rose at times, the highest point being 104°·2 F.; with this there was drowsiness, semi-coma, with incontinence of urine and fæces. At times the surface-temperature on the right side exceeded that on the left by 2° F. The sugar in the urine varied in amount, the largest quantity being 10 grains per ounce. At one time Cheyne-Stokes respiration was noted; dyspnœa set in with physical signs at the right base, and the patient died.

Post-mortem Examination.—Bases of both lungs pneumonic, with suppurating and gangrenous patches here and there. Extensive atheroma of the vessels at the base of the brain, and to a less extent in the median fissure and on the upper surface of the hemispheres. Cerebral ventricles slightly dilated. Left corpus striatum softened, also two centres of softening (hæmorrhagic) in the right corpus striatum. Left crus flatter and softer than right, and the left half of the pons in a similar state. Left facial and auditory nerves appeared smaller than the right. There was a large softening area in the right cerebellar hemisphere, and a smaller one in the left. It is to be noted that there was a double affection of the brain and cord, and that the more extensive damage in the left cerebral hemisphere corresponds with that in the right cerebellar lobe.

Vide Dr. Bastian's *Case-book*, Males, 1882, page 466.

LOCOMOTOR ATAXY.

The parts affected in locomotor ataxy are the posterior columns. It is generally taught that the essential lesion in these is of the outer portion, which adjoins the grey matter of the cornua, *i. e.* of the so-called postero-external columns. Cases have been described in which the disease was limited to these regions. In pronounced cases of long standing the whole of the posterior columns are involved, as in the specimen. The pia mater covering the posterior columns was also found thickened and adherent, and the posterior nerve-roots grey and dwindled. The change appears to be of the nature of an interstitial overgrowth of connective tissue with disappearance of the nerve-tubules (medullary sheaths and axis-cylinders). The vessels in the affected area are thickened and numerous, corpora amylacea occur in the sclerosed area. The changes in the posterior roots are similar. It is not yet determined whether interstitial overgrowth is primary and nerve-tube atrophy secondary, or the reverse.

3540. Three sections of the spinal cord, taken in the upper and mid-dorsal and lumbar regions, showing degeneration of the posterior columns in a case of locomotor ataxy. It will be seen that there is degeneration of the whole of the white substance limited in front by the grey commissure, and laterally by the posterior limit of the grey matter. The area of degeneration is indicated by the deeper staining of the parts.

In the dorsal sections there appears to be slight implication of the grey matter of the commissure and of the roots of the posterior cornua, but these appearances are only very superficial. The remainder of the cord is apparently quite normal. In the upper dorsal and lumbar sections the pia mater has been preserved, but it is not notably increased in thickness over the situation of the posterior columns.

History.—The patient, a man æt. 51, had suffered from syphilis for twenty-five years. The cord-symptoms had existed for about two years, commencing with incontinence of urine, especially at night. This was followed by weakness in the legs, with difficulty in walking upstairs and uncertainty of gait in the dark. For about three or four months vomiting would occur about one hour after food, especially after previous exertion. On admission to the hospital there was considerable loss of sensation in both legs; the plantar reflex and knee-jerk was absent on both sides. The pupils were much contracted, reacting to accommodation, but not to light—the so-called Argyll-Robertson pupil. There was grey atrophy of the optic discs. The patient died from laryngeal trouble, for which laryngotomy was performed. A full autopsy was refused, but the spinal cord was removed. The last dorsal and third lumbar vertebræ were carious.

Transverse Myelitis.

The specimens illustrate certain of the results which follow transverse disorganization of the cord, however this is brought about, viz. by injury, compression, or inflammation. The results of such are degenerative changes in two directions, descending and ascending. The descending lesions occupy the areas of the pyramidal tracts, *i. e.* in the lateral columns. The ascending occupy the posterior columns, and immediately above the injured area they occupy the whole of the posterior columns, but at higher and higher levels above this point the changes are gradually restricted to the postero-median columns. The significance of this is that the lateral parts of the posterior columns consist of fibres which run only a short distance in white matter before they dip into the grey, whilst the postero-median columns are composed of long fibres, which terminate above in a nucleus in the floor of the fourth ventricle. Accordingly, if the long fibres be interrupted at any one spot the degeneration extends throughout the length of their course, but, if the other fibres be affected, the degeneration extends only as far as these run in the white matter. The faint area of degeneration spoken of in the description of two of the sections as occupying the white matter on a level with the anterior cornu corresponds with an area of degeneration described by Dr. Gowers, and supposed by him to contain sensory fibres. The reason of its being seen on one side only may possibly be explained by the incompleteness of the transverse myelitis.

3541. Sections of the spinal cord, from a case of transverse myelitis in the dorsal region. The sections are taken in a series from the lumbar to the cervical region, and pass from right to left, beginning with the upper row of four. The first two specimens, from the lumbar enlargement, show nothing very obvious to the naked eye. The third section, dorsal region, shows some faint evidence of opacity in the posterior white columns. The fourth shows very distinctly opacity of the whole of the posterior columns, *i. e.* of the whole of the wedge of white matter included between the posterior limbs of the central grey matter from the tips of the cornua to the commissure.

In the lower row of sections, beginning with that on the right-hand side, the opacity of the white substance is observed to have limited itself to the posterior median columns, two small wedge-shaped areas immediately adjoining the posterior median fissure. In addition to this there is seen in the white matter of the cord, on a level with the anterior cornua, a faint area of opacity, but this does not extend quite up to the grey matter.

The middle section shows opacity of the posterior median columns, but much fainter; there is also a suspicion of opacity in the white matter of the antero-lateral column in a position corresponding to the faint area of opacity noted in the previous section. The last section shows faint opacity of the posterior median column, and in the antero-lateral column a similar condition to that seen in the other sections.

History.—The cord was that of a woman, æt. 40, who after exposure to cold was suddenly taken ill. There was paraplegia and loss of control over the rectum and bladder. The patient lived one month. Unfortunately no other particulars of the case can be obtained.

Tumours of the Cord and Membranes.

Primary tumours of the spinal cord or meninges are rare, of these the cancerous, sarcomatous, and fibrous seem to predominate. Secondarily the membranes and cord are often affected in the extension of growths springing either from the bodies or less commonly from the arches of the vertebra (No. 3542).

Regarding the effects of tumours implicating the spinal cord, the following may be noted:—

1. Tumours arising within the substance of the cord are painless as contrasted with tumours outside, but pressing on the cord.

2. The pain of extra-spinal growths is mostly continuous, though marked by exacerbations.
3. That the area of pain corresponds with the distribution of one or more nerve-trunks.
4. In the early stages there may be other signs of nerve-irritation in this area, *e.g.* hyperæsthesia and various skin-eruptions.
5. Later on this irritation may result in abolition of nerve-function, with the appearance of anæsthesia, atrophy, and contracture of muscles.

There are also the effects of pressure on the cord itself, viz. paralysis below the seat of pressure, with certain other effects indicative of secondary degenerative processes taking place within the cord and following ascending and descending paths from the point of compression.

3542. The lumbar and greater part of the dorsal portion of the spinal cord, with its membranes; these have been removed from the cord posteriorly. There is a tumour occupying the mid-dorsal region to the extent of about three inches; it presses on the left half of the cord, overlapping the mid-line and reaching outwards to the points of exit of the spinal nerves (the roots of three of which it implicates) from the dura mater. It is attached to, but does not seem to involve, the dura mater, which is quite smooth and does not show any thickening anywhere. The tumour is rough and nodulated, moderately firm in consistence, and presents on section a brain-like appearance, streaked here and there with black pigment. The cord in the neighbourhood of the growth appears swollen and somewhat softened in consistence. The microscope shows the tumour to be a sarcoma. 4042

3543. The upper part of the cord, medulla, and pons, with part of the crura cerebri, showing a tumour connected with the pia mater of the upper part of the cord. The growth is smooth on the surface, which is lobulated; it is soft in consistence, and its section shows a uniformly close texture. It appears to have originated in the subarachnoid alveolar tissue, since the vertebral artery runs over it, and its deep surface is separated from the cord by pia mater. Owing to the pressure of the tumour the olive on the left side has been pushed somewhat upwards, and this half of the cord is slightly compressed. The roots of the spinal accessory nerve would also be pressed upon. 2092

Microscopic Examination.—The tumour consists of numerous round cells with a reticulum of branched connective tissue. It is a glioma.

3544. The lumbar and dorsal portions of the spinal cord. The dura mater has been reflected. A nodulated tumour is seen attached to, but not apparently implicating, the dura mater. It has not produced any alteration in the shape of the cord. One of the nerves is stretched over the growth. At the upper end of the cord is a flattened rough area of new growth infiltrating its substance. 5976

SERIES LIV.—PARASITES.

TREMATODA OR FLUKES.

Definition. "Unsegmental Vermes, with a flattish, leaf-like, more or less cylindrical body provided with organs of adhesion in the shape of suckers and sometimes of chitinoid hooks. The cuticle, so called, appears to be a metamorphosed layer of cells. There is a well-developed nervous system, the ganglia of which are entirely supra-pharyngeal, *i. e.* dorsal. There is a mouth, and an alimentary canal which is usually forked, but no anus. The excretory system has the form of more or less branching tubes commencing with the flame-cells, and either ending in a contractile vesicle or opening by two independent orifices. Hermaphrodite self-impregnation occurs, as well as reciprocal impregnation. The embryo either develops direct into the sexual form (Monogenetic Trematoda) or gives origin to a series of intermediate non-sexual dimorphic forms (Digenetic Trematoda)" (Jackson).

Fasciola hepatica. Distomum hepaticum.

This parasite, rare in man, is common in the Ruminants, especially sheep, causing the disease known as *rot.*

The fully developed fluke is flat and measures about three quarters of an inch long by half an inch in breadth, but may somewhat exceed these measurements. The anterior end is prolonged into the constricted head and neck. At the end of this is the oval opening of the mouth. Just below the neck is a rather larger opening, the ventral. In the centre is a lighter-coloured portion occupying about $\frac{2}{3}$ of the body, indicating the situation of the male reproductive organs. This is bordered by a darker area corresponding with the situation of the yelk-forming organs.

The hinder end of the parasite is blunter than the head.

The colour is brownish yellow, and the surface smooth to the naked eye, but in reality covered with epidermal spines.

The eggs are very large, measuring 0·135 mm. long by 0·083 mm. broad. The parasite gains access to the body of the host through the agency of the grass it eats. The eggs of the liver-fluke reach the intestine by passing down the bile-duct and then escape from the body. The eggs probably require months for their full development.

The liver-fluke is a digenetic Trematode, and passes through the following stages in its development:—The development of the embryo occurs only outside the body of the host. The embryo, with the exception of the head, is ciliated; it swims about in the water and if it does not meet with its next host it speedily dies. This host is a small pond-snail. The embryo bores its way into the snail and then undergoes further development. It loses its cilia and is now called a "sporocyst," and consists of an elliptical cyst containing rounded masses of cells which form a digestive tract. The embryo is now known as a "Redia." The Redia usually finds its way into the liver of the snail by escaping from the sporocyst, and may kill the snail. The fully formed Redia is elongated, and has a mouth, pharynx, and digestive tract. The Redia contains masses of cells which develop into an elongated structure, the tail, the body being oval and depressed, and the embryo being provided with two suckers and a rudimentary digestive tract. This is known as the "Cercaria," and when it is fully developed it escapes from the Redia and from its host, swimming freely in the water. The Cercaria ultimately becomes encysted on the water-plants, and the tail separates and is lost: certain cells in the body throw out a gummy secretion which forms a hardened case round the Cercaria. The Cercaria encysted on the grass is eaten by the sheep and develops into the fluke.

3550. Three specimens of Fasciola hepatica from the sheep. The oral and ventral openings are plainly seen, and if the bottle is held against the light, the central lighter-coloured portion indicating the situation of the male reproductive organs is well seen. The margins of the parasite, which is coiled upon itself towards the ventral aspect, are slightly sinuous.

For other specimens *vide* Zoological Collections, Nos. D100, D101, D102, D103.

CESTODA OR TAPE-WORMS.

Definition. "Flat worms without mouth or alimentary canal, which typically develop by alternation of segments, by budding from a generally pear-shaped nurse, with which they remain united for a lengthened period as a ribbon-like colony or

'Strobila.' The individual joints of the colonies, *i. e.* the sexual animals or proglottides, increase in size and maturity as they are removed farther from their origin by the intercalation of new buds, but are not distinguished in any special way. The nurse, however, known by the name of head (scolex), is provided with four or two suckers, and usually with curved claw-like hooks. The dorsal and ventral surfaces of the head are perfectly identical, so that the arrangement of the hooks presents a striking radiate appearance. By means of this apparatus the worms fasten themselves on the intestinal membrane of the hosts, which (with one exception) all belong to the Vertebrata. The nurses or heads develop from little round six-hooked embryos in a more or less complicated fashion as so-called 'bladder-worms.' The latter inhabit very diverse, but usually parenchymatous organs of the higher and lower animals, and are thence passively transferred to the intestine of their subsequent host" (Leuckart).

Tænia saginata or mediocanellata. Beef Tape-worm.

The larval form (Cysticercus bovis) of this parasite is met with in cattle, and gains entrance to the body through the ingestion of imperfectly cooked beef. The worm varies in length from fifteen to thirty feet, being composed of segments (proglottides) varying in number from 1200 to 1300. The middle segments are the broadest, towards the tail-end the length exceeds the breadth. The sexual organs attain their full development at about the 450th proglottis. The testes are numerous and scattered throughout the proglottis. They are round vesicles containing spermatazoa and are attached to the ramifications of the vas deferens.

The uterus is composed of twenty-five to thirty branches on each side of a longitudinal channel; they fork repeatedly and terminate in club-shaped extremities. The genital aperture is situated on one side, about the middle of the segment. The ova are oval in shape and are often discharged into the intestine of the host, the shrivelled proglottis being passed per anum.

Near the head the segments are so close to one another that they can with difficulty be accurately counted. At first the grooves separating them are shallow, and the segments overlap one another from the head downwards.

The head, of quadrilateral form, does not possess any hooklets, but four slightly projecting suckers surrounded by dark pigment. After death the suckers are usually retracted. There is also a slight pit in the centre.

This tape-worm is liable to many malformations. The segments are only connected together by fine connective tissue and are cast off by muscular action.

3551. A specimen of Tænia saginata. It measures twelve feet in length. The head is pigmented, especially round the four suckers, which can be plainly seen with a lens. There is no rostellum or hooks. The neck is slender, and the segments, very small, are broader than they are long, the upper overlapping the lower. Lower down the disproportion between length and breadth is less marked. The genital pore is seen at the side of the segments. The worm was obtained at a post-mortem examination and was alive. 6151

3552. Tænia saginata. The head of the specimen is flattened and unarmed, and carries four suckers. The worm has been darkly stained.

3553. Portion of a Tænia saginata. The upper part is distinguished by the much greater breadth of the segments. At the end they are considerably longer than they are broad, while in the middle the length and the breadth are about equal. The upper segment overlaps the upper end of the one beneath it like the rim of a watch overlaps the glass. The genital opening can be plainly seen at the side of the segments. 1808

3554. Segments, probably from Tænia saginata, which are stated to have come from the bladder. The MS. Catalogue does not state the sex of the patient, but it is most likely that the proglottides had wandered from the anus to the vulva, and had then been washed away by the urine. 1004

For other specimens *vide* Zoological Collection, Nos. D 122 to D 125.

Tænia solium. Pork Tape-worm.

The Cysticercus cellulosæ or larval form of this worm constitutes the "measle" of pigs, and the larvæ gain entrance to the host by the ingestion of improperly cooked pork. As a rule the host only harbours one worm, but this is by no means always the case. The worm varies in length up to ten feet. The head is armed with a rostellum carrying twenty-six hooklets of two sizes, which alternate. There are also four suckers, and the head is pigmented. Near the head the proglottides are small and broader than they are long; about the middle they are square, and at the lower end the length exceeds the breadth, giving them the shape and appearance of melon-seeds.

The uterus is a central canal, on each side of which are seven or eight branched passages. The ova are globular and contain a six-hooked embryo.

The Cysticercus cellulosæ or larval form of this worm may be found in man and produce more serious troubles than does the Tænia itself. They are found in the muscular and connective tissue, and in the eye and brain. The Cysticercus attains its full development in about 2½ months and lives (in man) from three to five years. The Tænia solium has a life-period of ten to twelve years.

3555. Part of a Tænia solium from a girl, æt. 10. The neck is preserved, but not the head. The segments, as they recede from the head-end lose the marked disproportion between length and breadth noticeable at the neck and finally are longer than broad. The genital pore can be seen on some of the segments placed at one side about the middle. 1682

For other specimens *vide* Zoological Collection, Nos. D 116 to C 121.

Bothriocephalus latus.

This parasite, the largest met with in man, is composed of from 3000 to 4000 segments, and may attain a length of twenty-five feet. The head is about $\frac{1}{25}$ inch wide and cup-shaped; it is unarmed and possesses two deeply grooved suckers, one on each lateral aspect. The segments are broader than they are long, measuring in the middle about $\frac{1}{2}$ inch broad by $\frac{1}{7}$ inch long. The first sexually mature proglottis is met with about the six hundredth from the head. The uterus is unbranched and coiled upon itself. The ova are oval and much larger than those of the other tape-worms.

The proglottides, unlike those of ordinary tape-worms, do not separate singly, but many together. The source of the larval form of Bothriocephalus latus is not certainly known, but it is probable that it occurs in freshwater fish, especially the pike and burbot. The embryos are ciliated, and the larvæ have six hooks.

3556. A specimen of Bothriocephalus latus measuring between thirteen and fourteen feet. The neck is very slender, but the head is not present. The segments are broader than they are long, and in the centre is seen the uterine tube coiled upon itself in the shape of a rosette. 4167

History.—The worm was voided by a lady, æt. 26, after she had been taking male fern. She had resided in Switzerland, but did not pass the worm until she had been in England six months. The Bothriocephalus is extremely common in Switzerland, and is said to occur in nearly twenty-five per cent. of the inhabitants of Geneva.

For other specimens *vide* Zoological Collection, D 109 to D 111.

Cysticercus tenuicollis.

The Cysticercus tenuicollis is the larval form of Tænia marginata, the permanent hosts of the adult form being the dog and wolf. The Cysticercus has very rarely been found in man. The mature bladder-worm measures as much as six inches in length.

3557. Two specimens of Cysticercus tenuicollis, the bladder-worm of Tænia marginata. The head of the larger specimen is absent. In the smaller one the head is rounded, with a deep pit at the summit, but no hooklets can be detected. The cyst-wall is quite thin. 2350

Tænia crassicollis.

The larval form (Cysticercus fasciolaris) of this parasite is found in the livers of mice, the adult Tænia inhabiting the intestine of the cat. The Cysticercus is very small, not larger than a pin, and is so attached to the tail-end of the larval worm that it remained for a long time unrecognized.

3558. Four specimens of the Tænia crassicollis removed from the duodenum of a dead cat. The worms were found in the knotted condition shown, and were alive. The heads are composed of a rostellum with a row of hooklets and four suckers surrounding this. The ends are blunt, and the segments wider than long. 2382

Tænia echinococcus.

Vide page 43, also Surgical Catalogue, Part II. page 534; Zoological Collection, No. D 127.

3559. The parasitic cyst-wall of the Echinococcus. The cysts are daughter-cysts, the parent cyst being situate in the abdominal cavity. The cysts are translucent and gelatinous in appearance. 2285 A

3560. Small Acephalocysts from the same case as the preceding. 2285 B

3561. An Acephalocyst from an hydatid in the abdominal cavity. 1292

False Tæniæ.

3562. Portions of a fowl's intestine which has been cut up to counterfeit the proglottides of the Tape-worms.

In the MS. Catalogue it is stated that the specimen is one of the unconnected joints of Tænia discharged " per urethram." 2601

3563. A similar specimen to the preceding. The simulated joints are still connected by fine connective tissue. 80

NEMATODA.

Nematoid worms (some of which are non-parasitic) are characterized by their elongated thread-like form, varying very much in length in different kinds. The cuticle is often prolonged into spines and papillæ. The mouth opens at one end of the body, and the anus near the other. The alimentary tract is straight, stretching from the mouth to the anus, and can be divided into muscular œsophagus, cellular intestine, and muscular rectum. With few exceptions the sexes are distinct, the male being much smaller than the female.

Some of the parasitic Nematodes attain their full development in the body of a single host, but the greater number have to pass a certain time and undergo certain stages of development in the body of an intermediate host.

Ascaris lumbricoides.

This very common worm resembles very closely the ordinary Earth-worm. The male measures about four to six inches in length and the female six to ten.

The worms are cylindrical and taper at the ends, but more gradually towards the head. The sexual orifice in the female is about the middle of the body. The worms are usually found in numbers and inhabit the small intestine. They may be passed in large knots or bunches when they have passed into the great intestine. The ova are not developed in the human body, the minute worms probably gaining access to it through the medium of unfiltered drinking-water. It is probable that the life-period of the Ascaris in the human body does not exceed a few months. The worms may find their way into the stomach and be vomited or may escape into the abdominal parietes or viscera, giving rise to suppurative inflammation.

3564. Specimens of the Ascaris lumbricoides. The female worms are the larger, the longest one measuring ten inches. The worms were removed from the intestine of a young man who died of phthisis. 696

For other specimens *vide* Zoological Collection, No. D 135 and D 136.

Ascaris megalocephala.

This worm is found in all Solipeds. The male does not exceed seven inches in length, while the female is sometimes as much as seventeen. The caudal papillæ are very much more numerous than they are in Ascaris lumbricoides. The parasite is especially numerous in the small intestine, but may be found in any part of the alimentary canal. It is probable that the worm lives its whole life in one host, and does not require an intermediary. The parasites gain entrance to the host through the medium of impure drinking-water.

In the fresh state the body of the Ascaris gives off an irritating vapour which has been known to cause lachrymation with conjunctival irritation and violent attacks of sneezing in those engaged in its dissection.

3565. A specimen of a male and female *Ascaris megalocephala* from the small intestine of the horse. The worms have been dissected in order to show the reproductive organs.

The *female* is more than twice the size of the male and has a minute vulva situated in the anterior third of the body, in the mid-ventral region. The position of the vulva is generally marked by a circular band-like depression encircling the body at this level. From the vulva proceeds a narrow vagina terminating in the two uterine tubes. Each uterus is at first a thick tube, but it gradually tapers away into a slender ovarian tube many feet in length and of extreme tenuity at its termination. The two uteri and ovarian tubes are intimately twisted up together and round the intestinal canal, which is a simple broad tube lying behind the muscular œsophagus occupying the first half-inch of the body. The intestinal canal has thin walls, and ends in a horizontal anal cleft near the posterior extremity of the body.

The *male* sexual organs consist of a very minute horny tubular penis attached to the end of the vas deferens and capable of being protruded at the anal cleft. The vas deferens proceeding from the penis is a good-sized tube two inches in length, straight and ending abruptly in the testicle, which is composed of a single tube twisting round the intestine and gradually tapering away to an almost imperceptible termination.

The worms were dissected by Dr. H. C. Bastian, and he writes (MS. Catalogue):—

"These worms are imbued with some very acrid principle, as they always produced with me, after examining them for a short time, the most disagreeable effects, viz. irritation of the Schneiderian membrane and conjunctivæ, causing violent and continued sneezing, running from the eyes and nose, with inflammation of the conjunctivæ, and rapid effusion of serum beneath, if the eyes were at all rubbed to allay the itching produced. These effects were produced after the worms had been in spirit for six months." 4781

Oxyuris vermicularis.

This, the most common intestinal worm, especially attacks children, and is only found in the great intestine, living on the fæces. The male measures $\frac{1}{6}$ inch long, and the female $\frac{1}{3}$ to $\frac{1}{2}$ inch. They taper towards the tail, that of the male being obtusely pointed and of the female triple-pointed. The ova contain embryos when voided and they must, in order to undergo further development, be swallowed, the larvæ maturing in the small intestine. The worms wander from the anus at night, and so may infect another person sleeping in the same bed. Sometimes they creep into the vagina and cause inflammation of the mucous membrane.

Trichocephalus dispar.

The whip-worm infests the cæcum and ascending colon. It has a long slender neck occupying two thirds of its entire length, which is almost $1\frac{1}{2}$ to 2 inches. The surface, smooth to the naked eye; is furnished with papillæ on one side. The tail of the male is curved, of the female blunt and straight. At the tail-end of the male is a short penis-sheath armed with retroverted spines. The ova are spindle-shaped and do not develop in the body of the host, but are expelled per anum and require a further six months for their development. The whip-worm does not produce any symptoms. It buries its head in the substance of the mucous membrane of the gut.

3566. The cæcum, attached to the mucous lining of which are specimens of the Trichocephalus dispar or whip-worm. The blunter tail-ends are curved, and the long slender neck is not thicker than fine cotton. 695

Dracunculus medinensis.

The Guinea-worm measures from one to six feet in length and about one tenth of an inch thick. The only worm known is of the female type, but it is probable that the Dracunculus is hermaphrodite, since no male has ever been discovered. The body is cylindrical, the tail pointed, and the head truncated, with a central mouth surrounded by four papillæ. The worm is viviparous, and the young have a long tail. It is taken into the body through water, and the worm breeds in the stomach, the larvæ escaping per anum and undergoing further development outside the host. The worm migrates from the intestinal canal and becomes lodged in the connective tissue of the feet, legs &c., and excites inflammation and suppuration. It is probably identical with the fiery serpents which plagued the Israelites in the Wilderness.

3567. A specimen of Dracunculus medinensis which was removed from the foot of a man. It measures thirteen inches in length. 1085

3568. A specimen of Dracunculus medinensis, measuring two feet two inches in length. From long immersion in spirit the worm has lost its normal cylindrical shape and become somewhat flattened. The more tapering end is the tail. 4730

Trichina spiralis.

Vide Surgical Catalogue, Part I. page 184. Zoological Collection, Nos. D 137, D 138, D 139.

Filaria immitis.

This parasite infests the right heart of the dog, and is especially common in China. It is also found in the aorta and the œsophagus. At first the worm does not appear to produce any injurious effects, but after a time the dog loses health and spirits and is seized with severe convulsive attacks.

Vide Lancet, 1879, p. 317.

3569. The heart of a dog showing coagulation of the blood in the right auricle and numerous worms in the clot. The worms are specimens of the Filaria immitis. The dog came from Japan.

FALSE NEMATODES.

3569 A. A specimen of artificial nematodes probably made from the œsophagus of one of the lower animals (Dr. G. Harley). The MS. Catalogue states that they were voided from the bladder of a woman. 2405

Vide Medico-Chirurgical Transactions, vol. ii. p. 385.

WAX MODELS.

ACUTE PERITONITIS.

(*Vide page* 1, *Nos.* 3000 *to* 3003.)

3570. A wax model of the abdomen laid open, from a patient who died of acute peritonitis. All the viscera are coated with lymph, which mats the coils of gut together. There is much less lymph on the parietal than on the visceral layer of the serous membrane. Owing to the adherent lymph the peritoneum has lost its natural polished and shining appearance. 2579.

THE EFFECTS OF POISONS ON THE STOMACH.

(*Vide page* 9, *Nos.* 3040 *to* 3042.)

3571. A wax model of the stomach of a woman who died from the effects of sulphuric-acid poisoning. The mucous membrane is swollen, and the vessels between the rugæ filled with black blood; some of these appear to have burst, leading to extravasation. At the pyloric end, close to the great curvature, are three perforations, the largest is oval, the other round; they are deeply cut and funnel-shaped. The yellow fatty-looking mass was removed from the interior of the organ.

3572. A wax model of part of the liver of a woman who died from the effects of sulphuric-acid poisoning. The organ is of a deep brown colour, having completely lost its characteristic appearance. Its cut surface is studded with minute abscesses; these are, in some parts, grouped round the openings of the larger vessels.

From the same case as the preceding. 4202

3573. A wax model of the anterior wall of the stomach and part of the œsophagus and duodenum from a case of oxalic-acid poisoning. The mucous membrane of the gullet is rather whiter than usual, and shows longitudinal and transverse folds. The mucous membrane of the stomach is not so rugose as natural, and is deeply congested and inflamed. Similar appearances are noticed in the duodenum; these terminate abruptly at the lower end. 2727

3574. Three wax models showing the changes met with in poisoning from a small dose of arsenic. The stomach has been laid open along its small curvature. Its mucous membrane is seen to be dotted over by the enlarged openings of the glands; towards the fundus the vessels are slightly congested, and those patches where extravasation has occurred can be seen.

In both pieces of intestine it will be noticed that the Peyer's patch is more closely outlined than usual from slight swelling; in one piece the mucous membrane is paler than natural, in the other more congested. 2864, 2865

3575. A wax model of the posterior wall of the stomach and part of the œsophagus from a case of poisoning by ammonia. The mucous membrane is less rugose than usual and the vessels are injected. 2578

3576. A wax model of a stomach which has been laid open. The mucous membrane is studded with raised circular plum-coloured patches, varying in size up to that of a split pea. They are quite smooth on the surface, having raised up the inner layers of the membrane. 4331.

History.—The specimen was prepared from the stomach of a woman who was brought in dead. There was no history and no other post-mortem appearances. Dr. Harley was inclined to the opinion from his experiments that the case was one of lead-poisoning, but Sir W. Jenner attributed it to purpura.

3577. A wax model of the posterior wall of the stomach of a young woman who was poisoned by a strong infusion of colchicum. The mucous membrane is intensely congested and vermilion in colour. There is no evidence of destruction of any part of the surface. 2432

GASTRIC ULCER.

(*Vide page* 11, *Nos.* 3045 *to* 3055.)

3578. A wax model of the posterior wall of the fundus of a stomach. In the centre of the specimen is seen a rounded clean-cut ulcer, in the base of which are little projections with holes in them, these communicate with a vessel which has been laid open. Just above, to the right side of this ulcer, is a depressed cicatrix. The mucous membrane for some distance round is free from rugæ. 4809

3579. A wax model of the pyloric end of the stomach, laid open. On the posterior wall is a large circular ulcer about the size of half a crown; this has led to perforation of the walls. The aperture is round and measures ½ inch in diameter. The mucous membrane is congested. 2730

CANCER OF THE STOMACH.

(*Vide page* 14, *Nos.* 3056 *to* 3062.)

3580. A wax model of the pyloric end of a stomach with the beginning of the duodenum. The pylorus is the seat of an irregular mass of new growth, considerably narrowing its orifice. It is congested on the surface. 2816

3581. A wax model of a stomach laid open by removal of part of the posterior wall. A large mass of cancer projects from the anterior wall close to the pylorus, which it involves. The growth has been laid open and is irregular on the surface; in its substance numerous cavities are seen; these were due to degeneration of the growth. The stomach is much dilated, and the rugæ are not so well marked as usual. Flakes of yellow lymph are seen on the peritoneal coat.

In the MS. Catalogue it is described as a case of encephaloid cancer. 4364

3582. A wax model of a stomach the anterior wall of which has been removed. The mucous membrane is congested. Growing from the posterior wall at the fundus is a large elevated mass of new growth which has been laid open; its surface is irregular but apparently not ulcerated. The growth is distinctly circumscribed. It is described in the MS. Catalogue as encephaloid cancer. 2813

3583. A wax model of part of the stomach with the pylorus. The organ is much contracted, and the walls thickened, especially towards the pylorus. Attached to the great curvature is an enlarged gland. The thickening is probably due to scirrhous cancer. The mucous membrane is smooth. 4365

TUBERCULAR ULCERATION OF THE INTESTINES.

(*Vide page* 27, *Nos.* 3100 *to* 3107.)

3584. A wax model of the lower part of the ileum with its mesentery, the cæcum, and part of the ascending colon. The colon has been laid open above, and the ileum close to the ileo-cæcal valve. There is an extensive deposit of tubercle under the peritoneum; the masses have coalesced, giving a papillomatous appearance in places. At one part of the cæcum the vessels are intensely congested round the nodules. 4369

3585. A wax model of the lower part of the ileum with the cæcum, laid open. The ileum is the seat of tubercular ulceration, the seat of the ulcers is marked by a raised margin and depressed centre ; the smaller ulcers have almost coalesced. Tubercular nodules are also seen raising up the mucous membrane. 4362

3586. A wax model of a portion of small intestine with its mesentery, the seat of tubercular deposit. The peritoneal surface of the gut is smooth and polished, it is raised up here and there by round nodules of discrete tubercle. The mesentery is thickened and congested, and the mesenteric glands are enlarged. 4152

3587. A wax model of a piece of small intestine with its mesentery. Close to the mesenteric border of the gut numerous round tubercular nodules can be seen. These lie under the peritoneal coat raising it from the surface. They are for the most part discrete, but here and there have coalesced, although the outline of the individual nodules can still be made out. A few tubercles are also seen in the mesentery. The capillary vessels, especially at one end and along the free margin of the gut, are injected. 4363

3588. A wax model of a piece of small intestine which has been laid open. The mucous membrane is congested and is studded with numerous round or oval nodules quite smooth on the surface. Some of these are dead-white in colour, others yellowish and congested. Others again have undergone degeneration and have thus formed oval depressed ulcers with raised margins. The oval nodules and ulcers lie parallel with the transverse axis of the gut.

CIRRHOSIS OF THE LIVER.

(*Vide page* 36, *Nos.* 3129 *to* 3131.)

3589. Three wax models of the liver of a rum-drinker. The organ is somewhat smaller than natural, only measuring nine inches in its transverse diameter. The under surface is less concave than usual, and the Spigelian and caudate lobes, especially the latter, are enlarged and prominent. The surface is uniformly irregular and nodular from the formation of new connective tissue in its substance. In the smallest model it will be seen that the cut surface is intersected in all directions by pale bands of fibrous tissue. 2561

3590. Two wax models of a cirrhotic liver. The organ is much smaller than natural, and is coarsely lobulated on the surface, owing to the formation and contraction of scar-tissue in its substance. The capillary vessels on the surface are engorged. Streaks of inflammatory lymph adhere to the peritoneal surface. The specimen illustrates well the appearance of the so-called hob-nail or gin-drinker's liver. 2731

SUPPURATIVE HEPATITIS.

(*Vide page* 37, *Nos.* 3132 *and* 3133.)

3591. A wax model of the liver of a child who died from umbilical pyæmia. On the surface, especially of the right lobe, pale irregular tracts indicative of suppurative inflammation can be seen. There is no general perihepatitis. 5025

3592. A wax model showing an acute abscess in the upper part of the right lobe of the liver. Close to the falciform ligament is a distinct cavity containing pus ; this has been laid open. External to this there is diffuse suppurative hepatitis, the pus not being enclosed by an abscess-wall. The hepatic vessels are congested, and the intervening liver-substance pale, the whole presenting a mottled appearance. 5014

3593. A wax model showing a large abscess-cavity situate in the left lobe of the liver. The abscess has involved the whole lobe with the exception of a small piece anteriorly. 2811

SYPHILITIC HEPATITIS.

(*Vide page* 39, *Nos.* 3134 *and* 3135.)

3594. Two wax models showing gummata in the liver. The masses are round, circumscribed, yellow and non-vascular, the cut surface is flat. Those seen projecting on the surface are smooth and rounded, some of them showing slight umbilication. 4864

CANCER OF THE LIVER.

(*Vide page* 40, *Nos.* 3137 *to* 3155.)

3595. Two wax models of a liver affected by cancer. The organ is somewhat paler than natural, being probably fattily degenerated, and its surface is mottled, the dark spots representing the engorged vessels. Rounded nodules of new growth project from the surface. They are distinctly circumscribed and many of them are umbilicated, owing to central degeneration having taken place. The smallest model shows at one end three nodules imbedded in the liver-substance; the centre of each of these is depressed, but the margin is raised above the level of the section of the liver; this appearance is due to the fact that degeneration has occurred in the centre, *i.e.* the part furthest removed from the vessels and therefore least nourished, while growth has advanced peripherally. 2575

3596. Three wax models. The middle one shows a small slice of liver containing nodules of new growth. These nodules are of a dead white colour and project above the level of the section; they are quite circumscribed, but not encapsuled; the surrounding liver-substance is normal in appearance. The other two models show the enlargement of the umbilicus, inner and outer aspects, which occurs sometimes in cases of cancer of the liver. 5338

History.—John Price, æt. 41, was admitted into University College Hospital under the care of Sir William Jenner. There was an irregular enlargement of the liver and the umbilicus was indurated and thickened. At the P.M. examination a mass of cancer was found involving the stomach and pancreas and there were secondary deposits in the liver.

3597. A wax model of a portion of liver very extensively affected with cancer. The new growth occurs in nodules, more or less rounded in general outline and distinctly circumscribed. Small vessels are seen coursing over the surface of the growth. Hardly any liver-substance can be seen. The vessels are congested. The cancerous nodules do not show any naked-eye degenerative changes. 4354

3598. A wax model of a piece of liver situate in the substance of which are two round nodules of cancer. The liver-substance is very pale and in a state of fatty degeneration. Its peritoneal coat is covered with inflammatory lymph. The cancerous nodules are distinctly circumscribed. 4353

3599. A wax model of a piece of liver showing a nodule of encephaloid cancer. The new growth is distinctly circumscribed and bulges above the surface of the liver. It is of a white colour and not undergoing degeneration, so that its surface is not umbilicated. The surrounding liver-substance is healthy. 4352

3600. A wax model of the liver, spleen, omentum, and small intestines. The liver is extensively affected by cancer, many round umbilicated nodules project on the surface. The liver, spleen, and intestines are coated with lymph, the result of a general peritonitis set up by the cancer. 2738 A

3601. A wax model of a piece of liver affected by carcinoma. Numerous rounded masses of new growth are seen projecting on the surface of the organ and also above the level of the section. They are pale in colour, distinctly circumscribed but not umbilicated. Owing to the softness of the growths they bulge beyond the level of the surrounding liver-substance, which is unaffected. 2738 *b*

From the same case as the preceding.

HYDATIDS OF THE LIVER.

(*Vide page* 43, *Nos.* 3157 *to* 3168.)

3602. Two wax models of hydatid disease of the liver. The smaller one shows a cyst laid open and imbedded in healthy liver-substance, but projecting on the upper surface. The cyst contains numerous round daughter cysts of varying size and smooth on the surface. The inner surface is irregular, transparent, and gelatinous in appearance; this is the parasitic cyst-wall, the line of demarcation between this and the adventitious fibrous wall cannot be made out. The large model represents the right lung, a part of the diaphragm, and the enlarged liver. Situate in the right lobe of the liver, at its upper and posterior part, is a cyst which has been laid open; this had burst through the diaphragm (the fistulous track being marked by a piece of wire) into the base of the lung, where there is a similar though somewhat smaller cavity. The interior of these cysts is irregular and yellow in colour. It is probable that suppuration occurred in the liver-cyst and the abscess then burst into the lung. The cyst in the liver has a distinct limiting membrane, this is not present in the lung. 2568

3603. A dried preparation of a very large hydatid cyst which occupied the left lobe of the liver. It contained numerous daughter cysts, and the fluid, according to the MS. catalogue, was viscid. 739

COLLOID CANCER OF THE SPLEEN.

(*Vide page* 55, *Nos.* 3213 *to* 3215.)

3604. A wax model of the spleen preserved in No. 3214. The model was made immediately after the removal of the organ from the body. The colloid material closely resembles amber in appearance. 4075

FATTY HEART.

(*Vide page* 69, *No.* 3259.)

3605. A wax model of a heart in an early stage of fatty degeneration. The muscular tissue is represented as paler than usual, especially near the visceral pericardium. The free borders of the valves are nodular. 5237

MORBID GROWTH IN THE HEART.

(*Vide page* 75, *Nos.* 3285 *to* 3292.)

3606. A wax model of a heart showing numerous nodules of new growth scattered through its substance. 4237

History.—The patient was a man under the care of Dr. Parkes. At the post-mortem nodules of new growth were found in the liver, stomach, pancreas, lungs, and muscles. The largest mass was in the liver, and was of the size of a goose's egg. The heart was soft and flabby, and microscopic examination showed the muscular fibres to be fatty. In the MS. Catalogue it is stated that microscopic examination of the tumours showed them to consist of "abundance of cancer-cells, the caudate kind predominating. Besides the cells was a large quantity of melanotic pigment in free granules and in the cells themselves." The growths were evidently melanotic sarcomata.

PLEURISY AND EMPYEMA.

(*Vide page* 86, *Nos.* 3340 *to* 3350.)

3607. A wax model of a lung showing roughening of the pleural surface by inflammatory lymph. 2796

3608. A wax model of part of the chest-wall, from the same case as the preceding, showing lymph on the surface of the costal pleura as the result of Acute Pleurisy. 2796

3609. A wax model showing inflammatory thickening of the pleura, and caseous tracts in the lung-substance. 4761

3610. A wax model of part of the thoracic wall, from a case of empyema. The pleura covering the ribs is covered with purulent exudation. The empyema burst in the sixth left interspace just external to the costo-chondral articulation. 5015

PULMONARY COLLAPSE AND EMPHYSEMA.

(*Vide page* 89, *Nos.* 3355 *to* 3358.)

3611. A wax model of the lung of an infant aged seven months showing the depression formed by the projection inwards of the sternal ends of the ribs in rickets. There is collapse of the lung along the depression and marked emphysema of other parts of the lung, especially well seen in the lower lobe. 4163

PNEUMONIA.—ABSCESS AND GANGRENE OF THE LUNG.

(*Vide page* 91, *Nos.* 3362 *to* 3364.)

3612. A wax model of hepatization of the lung. At the upper part it is injected, but the greater part is pale in colour, the vessels having been pressed upon by the inflammatory effusion. 2507

3613. A wax model from a case of purulent infiltration in a pneumonic lung. The cut surface is yellow in colour, except where it is pigmented. There is a considerable amount of pigment beneath the visceral pleura. 2798

3614. A wax model from a case of pneumonia associated with acute pulmonary tuberculosis. The colour of the organ is deepened, and its cut surface is thickly studded with minute greyish semitransparent nodules which project slightly beyond the surface of section. 2800

3615. A wax model of the lung of a patient who died of pneumonia following on tubercular phthisis. The lung is pale but pigmented, and the cut surface shows numerous small cavities due to destruction of the pulmonary substance. 2801

3616. A wax model of a lung. The pleural surface at the apex is covered with lymph. The cut surface shows the organ to have been intensely congested and to have been studded with pale masses projecting somewhat beyond the surface. At one part, near the surface, this pale material has softened and given rise to an abscess-cavity. The condition most likely represents a lung secondarily affected in a case of pyæmic infection, the pale areas being suppurating patches due to embolism. 4874

3617. A wax model of portion of a lung from a case of pyæmic infection. Small yellow spots indicate the presence of secondary abscesses; at the margin larger yellowish areas are seen. Irregular yellow lines are seen on the surface between the lobules; these represent patches of purulent infiltration of the connective tissue. 4367

3618. Two wax models showing small abscess-cavities in their substance. The lungs were emphysematous. 4368

3619. A wax model of the lung of a child showing extensive destruction in consequence of gangrene. The sloughing is in the centre of the organ. The pleura is covered with lymph. 4172

3620. A wax model showing extensive gangrene of a lung. The gangrenous cavity is dark in colour and irregular, and large bronchi are seen opening into it.

PHTHISIS.

(*Vide page* 92, *Nos.* 3370 *to* 3388.)

3621. A series of wax models of various organs from a guinea-pig after inoculation with tubercle.

a. The liver from a guinea-pig after inoculation with tubercular matter. It is enlarged and studded with pale tracts of confluent granulations.

b. The spleen is enlarged and altered in appearance by the presence of tubercles, which in some parts have coalesced to form larger areas of disease. Some of the tubercles are yellow in colour owing to degeneration.

c. The heart and lungs, the latter being studded with tuberculous nodules, grey and semitransparent at the margins, and in some places slightly opaque in their centres.

d. A lymphatic gland from a guinea-pig which had been inoculated with decomposing muscular tissue which induced tubercles. The gland shows cheesy masses in its substance.

e. The liver of a guinea-pig treated in the same way as in the preceding case. Scattered through the organ are tubercular nodules; some of these are of a greyish colour, others yellow from degeneration.

f. The lungs showing changes similar to those in model *c.* 5310

Vide Dr. Wilson Fox, " On the artificial production of Tubercle in the Lower Animals," Plate I.

3622. A wax model of a lung from a case of acute phthisis. The organ is pale and the cut surface of a yellowish colour from infiltration with purulent inflammatory products, which have rendered it solid. At the apex is a cavity containing pus. 2560

3623. Two wax models from cases of pulmonary tubercle. In one model the lung-substance is paler than natural and is studded with greyish nodules which project beyond the surface of section, and where the lung is uncut render the surface finely nodular. These nodules are grey granulations. The other model shows larger yellowish masses, and the lung-substance is of a deeper colour than natural and apparently in a state of red hepatization. 2758

3624. A wax model of a left lung showing a cavity in its apex, and just below this a puckered cicatrix on the surface marks the position of a healed vomica. The surface of the lung is mottled and nodular, the nodules representing tubercular deposits. 4154

3625. A wax model of a hand showing the clubbing of the finger-ends which is met with in tubercular patients. 2535

GUMMA OF THE LUNG.

3626. A wax model of an injected lung showing numerous gummata in its substance. They are readily distinguished by their pale colour as they are non-vascular. They are situate near the surface of the organ. 5402

History.—S. H., æt. 48, had been married twenty-seven years. She had had three or four miscarriages but never any living child. Seven years after marriage she was suffering from undoubted secondary syphilis. Two years before admission to the hospital she suffered from pains in the head, followed in a year by swellings which ultimately disappeared. Sight failing for one year. She was also occasionally unconscious and articulation was impaired. On admission under Dr. Wilson Fox there was right-sided torticollis; partial right hemiplegia; ptosis on the right side; paralysis of the external rectus, and sloughing of the cornea. There was also dysphagia. The patient died from exhaustion. At the post-mortem there was softening of the optic thalamus, pulpy softening of the right first, both second, left third, and both fifth cranial nerves. Liver small and cirrhosed. Gummata in the spleen and right lung.

MORBID GROWTH IN THE LUNG.

(*Vide page* 97, *Nos.* 3391 *to* 3405.)

3627. A wax model of a lung affected with secondary masses of malignant new growth. The lung-substance is deeply pigmented. The masses of growth are quite localized but not encapsuled, and stand out from the surrounding surface. The growth was most likely a sarcoma. It affected one of the lumbar vertebræ and the sterno-clavicular joint. 2799

Vide Surgical Catalogue, Part I. Nos. 689 and 690, from the same case.

ATROPHY AND DEGENERATION OF THE KIDNEY.

(*Vide page* 103, *Nos.* 3416 *to* 3419.)

3628. Two wax models of fatty kidney. The organ is enlarged. There is a considerable amount of fat in the hilum round the ureter. The surface of section is extremely pale. 5067

3629. A wax model of a kidney laid open to show dilatation of its pelvis, with a corresponding degree of atrophy and absorption of the pyramids. 4359

CYSTIC DISEASE OF THE KIDNEY.

(*Vide page* 104, *Nos.* 3420 *to* 3428.)

3630. A wax model of a kidney which was much enlarged from cystic disease. Projecting on the surface are numerous rounded, thin-walled translucent cysts. The colon lies across the organ, on a level with the hilum. 5376

History.—The kidney from which the model was made was removed from a patient who died eighteen hours after admission to the hospital from retro-pharyngeal suppuration. The other kidney was similarly though less extensively affected. There was no history of any renal disturbance during life, and the patient had been very temperate.

BRIGHT'S DISEASE.

(*Vide page* 107, *Nos.* 3429 *and* 3430.)

3631. Two wax models from a case of scarlatinal nephritis. The kidneys are swollen and intensely congested. On the surface a few pale areas are seen, indicating points of suppuration. 4357

3632. Two wax models of the kidneys, from a case of Bright's disease. The organs are pale, but not markedly diminished in size. The cortex is slightly wasted. Numerous small round cysts are seen in section, and on the surface of the organ are represented by depression, the cysts having collapsed post-mortem. 2804

3633. Three wax models of kidneys from chronic Bright's disease. Part of the capsule has been left on one model, and it is seen to be thickened. The kidneys are typically granular on the surface and much smaller than natural. The section shows that the cortical substance is diminished in thickness. At one end of the cut surface a cyst has been laid open. 2803

3634. Wax models of the kidneys. They are both congested and granular, and the capsules have been stripped off. The right kidney is much smaller than natural, and on its surface are numerous rounded depressions corresponding with retention-cysts, which had collapsed. The left kidney is smaller than natural and lobulated. 2808

RENAL ABSCESS.

(*Vide page* 108, *Nos.* 3435 *to* 3438.)

3635. Two wax models of suppurative inflammation of the kidney. The capsule has been stripped from the uncut kidney, the surface of which is studded with elevated yellow nodules indicating the position of abscesses. The surface is mottled from congestion of the cortex in the neighbourhood of the abscesses. The cut surface is pale in colour, and the medullary substance is studded with petechial hæmorrhages. The kidneys are considerably enlarged. 2540

3636. Wax models of a kidney, from a case of pyæmia. The organ is enlarged and congested, and petechial hæmorrhages are seen on the mucous surface of the pelvis. The surface is irregular and studded with minute yellow areas of suppuration. 4358

3637. Two wax models of a kidney, from a case of pyæmia. Numerous patches of suppurative inflammation are readily distinguished by their yellow colour. These project on the surface of the organ, and on the surface of section are seen to affect cortical and medullary portions. The pelvis of the kidney is of a greyish colour, and is traversed by congested vessels. The tips of the papillæ are of a deep plum-colour, and are said to have been in a state of gangrene (MS.). 4335

TUBERCULAR KIDNEY.

(*Vide page* 109, *Nos.* 3440 *to* 3448.)

3638. Three wax models of kidneys. The uncut organs are considerably enlarged, and one is lobulated. The section shows a uniform mortar-like deposit throughout the kidney and in the pelvis. The individual pyramids can be distinguished. The specimen is probably one of tubercular disease. 4360

TUMOURS OF THE KIDNEY.

(*Vide page* 110, *Nos.* 3449 *to* 3451.)

3639. A wax model of a kidney, which was the seat of soft glandular cancer. No trace of renal substance can be seen, the much enlarged organ having been completely infiltrated with cancer. Three large masses of new growth are seen projecting into the dilated pelvis; one of these is discoloured by hæmorrhage. In the MS. Catalogue it is stated that the organ was also the seat of acute inflammation. The substance of the growth was degenerated, and extravasation of blood has taken place into it. 2806

3640. A wax model of part of a kidney, showing masses of secondary new growth in its substance. The masses are easily recognized by their pale colour. The larger one has undergone degeneration. 2805

GRAVEL IN THE KIDNEY.

3641. A wax model of a right kidney, showing uric acid filling the pelvis and in isolated patches in the pyramids. The salt is in the form of gravel. 4169

History.—The patient was a woman, æt. 72. For some years before death the urine had been scanty, and the patient had passed gravel, micturition being painful. She had never had gout, but belonged to a gouty family. The left kidney was much smaller than natural, being less than half its normal size. The pelvis and calices were dilated, and the secreting substance of the organ not more than $\frac{1}{8}$ inch thick. No cause of obstruction could be found.

EMBOLI IN THE KIDNEY.

3642. A wax model of a kidney deprived of its capsule. The organ is enlarged and congested. On the surface are numerous pale yellow areas, the result of embolism in a case of endocarditis. 2810

VESICLES IN THE URETER.

3643. A wax model of half a kidney, with its ureter laid open. The organ is pale, and the cortical substance diminished in thickness. The ureter is studded, especially at the upper end, by small round vesicles projecting boldly from the surface of the mucous membrane. 2807

MENINGITIS.

(*Vide page* 111, *No.* 3460.)

3644. A wax model of the cerebellum, medulla, and pons, from a child who died of simple basic meningitis. A puriform exudation covers the surface of the medulla and pons, and spreads on to the cerebellum, covering the flocculus. Lymph is also found on the under surface of the cerebellum on either side of the median fissure, also in the subarachnoid space.

APOPLEXY.

(*Vide page* 112, *Nos.* 3466 *to* 3474.)

3645. A wax model of a part of the brain, the right ventricle being exposed, in the anterior half of which is a large blood-clot, which seems to have extended into the third and left lateral ventricles. Scattered over the surface of the optic thalamus are several small hæmorrhagic spots. The larger extravasation has ploughed up the substance of the corpus striatum, and from its position and size points to rupture of one of the large vessels supplying that part. 4373

3646. Two wax models, showing cerebral hæmorrhage in a boy who fell from a horse. The frontal lobes are lacerated and the surface covered with blood-clot. Smaller patches are seen on the temporo-sphenoidal lobes. The cut surface shows hæmorrhages in the substance of the brain. 2781

3647. A wax model of a brain, showing cyst-like cavities produced as the result of hæmorrhages into the brain-substance. They are situate in the white substance just below the cortex. The surrounding parts are stained of a yellowish colour by altered blood-pigment. Recent hæmorrhages were present in other parts of the brain. 2782

ANEURYSM OF THE CEREBRAL VESSELS.

(*Vide page* 115, *No*. 3475.)

3648. A wax model of the brain, showing extensive disease of the cerebral arteries at the base, with softening of the right frontal lobe. The basilar artery has been laid open, and is seen to considerably but uniformly dilated in its entire length; its terminal branches (posterior cerebral) present a very uneven outline. The right internal carotid, just where the middle cerebral arises, is the seat of a sacculated aneurysm the size of a marble; from this the posterior communicating is given off. The middle cerebral is involved in the dilatation. A second aneurysm considerably smaller is seen on the middle cerebral at the spot where it begins to divide over the island of Reil. The right anterior cerebral and anterior communicating arteries are uniformly dilated. The left middle cerebral from its commencement almost to the lower end of the fissure of Rolando presents a general fusiform enlargement, as do the branches from it going to the anterior perforated spot. The left hemisphere is apparently healthy, but the right one shows softening of the frontal lobe, extending as far back as the anterior limb of the Sylvian fissure. Over the base of the third frontal convolution is an area of congestion; this and the softening are due to the obstruction in the arteries supplying the parts. 2780

CEREBRAL THROMBOSIS AND EMBOLISM.

(*Vide page* 115, *Nos*. 3480 *to* 3483.)

3649. Two wax models, showing thrombosis of the superior longitudinal sinus, and cerebral softening with capillary hæmorrhages. The sinus has been split up, and is seen to contain a pale red clot, which extends into the openings of the cerebral veins; it is stated to have been adherent to the walls. The centrum ovale minus of each hemisphere has been exposed by a horizontal section; the most marked changes are seen in the right hemisphere, in the middle part of which the brain-substance is distinctly softened and broken down. The softened area presents a greenish-yellow colour. Both in front and behind this the brain is swollen and pulpy, being in marked contrast with the condition of the opposite hemisphere. Capillary hæmorrhages, best marked on the cortex, beset the surface over the whole area of softening, extending forwards into the frontal lobe. The pia-arachnoid seen behind the level of section is of a deep red colour, the result of multiple extravasations. A large superficial vein in the occipital region is distended by blood-clot; another one at the lateral aspect, seen in cross section, is in a similar condition. In the left hemisphere the changes are chiefly confined to the neighbourhood of the longitudinal fissure, where the hæmorrhages are numerous, a few are also seen in the centrum ovale. There is but little evidence of softening. A vein in the occipital region is thrombosed. 4161

History.—A. D., aged 15, was admitted into the London Fever Hospital on April 9th, 1856. On admission she stated that she had been ill for a week, but she was too ill to give any clear history. She was much emaciated, and in an extremely dirty condition, very prostrate, and suffering from slight headache and great nervous depression. Pulse 136. She was quite conscious and rational, but, on being asked questions, cried, and was extremely nervous. Bowels not been open for a week. The tongue was slightly furred; the skin and mucous membrane very pale. Physical examination showed the heart and lungs to be healthy. The condition gradually became worse till April 14th, when slight delirium supervened, although she could be roused to answer questions. Pulse 130. On 13th and 14th there were contractions of the limbs, on the 15th coma, passing fæces and urine involuntary. The breathing was slow and heavy, with tracheal rhonchus. She remained in this condition, the limbs remaining motionless, until the 17th, when death occurred.

3650. Three wax models, illustrating thrombosis of the superior longitudinal sinus, with softening of the coagulum, accompanied by secondary thrombosis of the cerebral veins and capillary hæmorrhages into the surrounding cortex.

One specimen shows the dura mater of the vertex, with the longitudinal sinus laid open; this is seen to be completely filled with discoloured clot which is undergoing softening, and at two places actual suppuration seems to have occurred.

Another model shows thrombosis of a large superficial vein in the postero-parietal region, which extends from the median almost to the Sylvian fissure. The surface of the brain for some distance round shows punctiform extravasations. A smaller vein lying in a sulcus more anteriorly is in a similar condition, as is the cortex in the neighbourhood. The surface-veins are also more marked than usual in parts of the frontal and occipital regions, and there are also patches of ecchymosis.

The third specimen shows a section of the brain made at right angles to the longitudinal fissure, in front of and parallel to the large thrombosed vein. The minute extravasations are seen to penetrate into the white substance, though they are here much less numerous. There is yellow discoloration of the surface extending beyond the patches of hæmorrhage. The tendency to suppuration of the clot is in favour of its septic origin. 2504

3651. A wax model of the cerebral hemispheres, showing extensive capillary hæmorrhages on the surface associated with thrombosis of the superior longitudinal sinus and one of the cerebral veins. The anterior four-fifths of the upper surface is of a deep red colour, which extends into the median fissure. This colour is due to intense congestion of the veins and numerous punctiform hæmorrhages; these are plainly seen posteriorly. At the post-mortem the superior longitudinal sinus was found filled with a large firm clot, extending into several of the veins, some of which are shown in the posterior part of the model. The venous congestion and capillary hæmorrhages were probably secondary to the thrombosis. A blood-clot was found beneath the arachnoid on the right side. 4022

History.—The patient was a child aged 15 months, who suffered from an extensive scald of the greater part of the skin of the abdomen, genitals, left thigh, and back of the left leg. The child rallied during the first few days, but then cough and frequent breathing appeared. During the last tweny-four hours of life there were frequent convulsive attacks. At the post-mortem, in addition to the cerebral condition, bronchitis, with consolidation of the lungs, was found. The duodenum was healthy. The case is of interest as illustrating the association of cerebral congestion with extensive scalds.

3652. A wax model, from a case of acute softening of the brain with thrombosis of the veins, in an infant a few months old. The thrombosed veins appear as black cords on the surface of the brain; at one or two spots in the neighbourhood of these veins the pia-arachnoid is of a deep red colour from arachnoid hæmorrhage. The area of softening occupies the white substance of the centrum ovale; the cortex, except for the presence of a few punctiform hæmorrhages, is unaltered in appearance. The softened area is dark red in colour and is disintegrated. The specimen shows an unusual position of softening from venous thrombosis, the cortex being more frequently affected. 4162

3653. A wax model, showing an excess of red points (état sablé) in the white substance of the cerebrum. The distinction between the grey and white matter is less marked than usual.—An excess of red points, such as shown in the specimen, is given as evidence of hyperæmia of the brain. It is, however, a much disputed point how far the post-mortem appearances can justify the statement that there was hyperæmia during life. The fulness of the large surface-veins, so frequently seen in the occipital region, appears to be the result of post-mortem subsidence. But it may be reasonably inferred that hyperæmia existed during life if, at the post-mortem examination, we find engorgement of the vessels of the brain, integuments of the scalp and diploë of the bones, and with numerous red spots and fulness of the vessels of the dura mater and of the cerebral sinuses. In addition the brain will often be found swollen and the meninges deeply congested, the choroid plexuses dark, swollen, and the vessels engorged and tortuous. The brain-substance is often dark-coloured, and this is most noticeable in the grey matter. The surface of section, as in the model, is dotted with small red spots, from which blood exudes. In long-standing cases of congestion hæmatoidin crystals can be found in the sheaths of and round the vessels. 4374

TUMOURS OF THE BRAIN.

(*Vide page* 121, *Nos.* 3500 *to* 3519.)

3654. A wax model of the brain of a child, the lateral ventricles having been exposed by removal of part of the hemispheres. A large tumour, which has been bisected, is seen projecting from the inner side of the head of the left caudate nucleus, pushing outwards the grey nucleus. The left optic thalamus is displaced backwards, and the structures of the middle line to the right. The surrounding parts are apparently unaltered. The growth was of a greyish colour, resembling the grey matter of the hemispheres; it was not vascular, and microscopically showed the characters of a glioma. The specimen is much impaired by alterations having taken place in the wax. 5375

History.—The patient, a boy aged 7, was admitted under Dr. Ringer's care, on Feb. 19th, 1871. There was a history of headache for three weeks, vomiting two weeks, no constipation, and no affection of the special senses. The patient was much emaciated. The head was very large. The day after admission he was seized with severe convulsions, accompanied by loss of consciousness and involuntary micturition. These fits recurred with intervening short states of consciousness until death, which occurred on Dec. 28th.

3655. Three wax models of portions of a brain, the seat of secondary deposits of encephaloid cancer. In the cortex of the hemispheres and both lobes of the cerebellum are seen nodules of new growth of various sizes, but generally rounded in outline with defined margins. The colour is pale like the white substance of the brain. In the masses occupying the hemispheres hæmorrhage has taken place, and small hæmorrhages are also seen in the cerebellar growths, the larger of which is hollowed out in the centre, owing to degenerative changes. 4371

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